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NETWORK WORLD

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

FCC delivers plan to clear the airwaves

BY ELLEN MESSMER

Washington, D.C.

The Federal Communications Commission last week laid out its plan for evicting microwave users in the 2-GHz radio bands to make way for providers of personal communications services.

As planned, once a PCS provider files an FCC application requesting spectrum, it has to begin to negotiate the cost — which it will bear — of moving incumbent microwave users to new frequency bands.

If voluntary negotiations between the PCS applicant and the microwave user are not successfully concluded in two years, a one-year mandatory negotiation period would follow, leading to the eviction of the microwave user from the bands.

The FCC last week said microwave users will be able to migrate to bands in the 4-GHz to 11-GHz range, now occupied mostly by common carriers.

The FCC's strategy of requiring PCS providers to pay for the eviction of microwave users in the 1800-MHz to 2200-MHz bands has won approval

See PCS, *page 46*

© WIDE WORLD PHOTOS

Vice president Al Gore and entourage survey flood damage.

Waterlogged users fight to fend off mighty Mississippi

BY NETWORK WORLD STAFF

As heavy rains continued to swell the Mississippi and its tributaries, users in the Midwest last week turned to wireless nets and other strategies in a scramble to restore washed-out networks.

From Minneapolis to St. Louis, sandbags weren't enough to keep the Mississippi from spilling into the data centers and central offices of scores of businesses and telephone companies. Likewise, fortification proved only a minor hindrance for the Missouri River, as it swamped workplaces from Sioux City to St. Louis.

Hardest hit was Des Moines, Iowa, where flooding contaminated drinking water and forced many businesses to close. It even disabled the Des Moines Police Department's wireline and cellular phones and mainframe computer, hampering efforts to deal with the watery emergency — not to mention a visit from President Clinton.

"It may be a month before we get our normal Centrex hack," said Sgt. Tim Cunningham, chief of staff of the Des Moines Police Department.

See Mississippi, *page 46*

PictureTel offers up PC-based video

BY ELLEN MESSMER

Danvers, Mass.

In a move that may speed the arrival of desktop videoconferencing, PictureTel Corp. last week announced PictureTel Live PCS 100, one of the first personal computer-based conferencing systems that adheres to industry standards.

The product, which comprises software and two boards for AT-class PCs, will let users establish full-motion, color videoconferencing sessions from desktop machines via dial-up Integrated Services Digital Network Basic Rate Interface or 56K bit/sec switched digital links.

The $5,995 product is scheduled to ship in the fourth quarter of next year and will include a speakerphone and a small camera called the FlipCam, which doubles as a document stand. The system offers full-screen resolution of 352-by-288 pixels, supports Super VGA graphics and runs at 7 1/2 to 15 frame/sec.

Two or more Live PCS 100 desktop units conducting a videoconference can exchange computer files and access a Shared Whiteboard, a notepad that the users can simultaneously annotate and point to. The desktop system's Snapshot feature enables images to be captured from video windows and pasted into documents or files.

PictureTel's support for the H.320 set of videoconferencing standards approved by the Telecommunication Standardization Sector (TSS), formerly the CCITT, augers well for the PC-

See Desktop, *page 46*

NETWARE

Novell delivers a 4.0 upgrade with a hitch

BY CARYN GILLOOLY

Provo, Utah

A few months after launching NetWare 4.0, Novell, Inc. last week quietly issued a new release of the high-end network operating system that is not backward compatible with the directory services in the original.

The new version includes NetWare Directory Service (NDS) enhancements, support for five Macintosh users, new OS/2 Presentation Manager utilities and updated Virtual Loadable Modules (VLM). In addition, every box of NetWare

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YOUNG

NetWare security, app development coverage, page 7.

4.01 comes with support for five languages: English, French, German, Italian and Spanish.

These are only the first of the many planned enhancements. According to sources within Novell, the company also plans to release utilities that let administrators more easily manage things like directory trees, although further details were not available.

These are two capabilities users have been asking for since 4.0 went into beta test.

Further down the road, Novell will add multiprocessing capabilities, according to Boh Young, director of NetWare product marketing for Novell's NetWare Systems Group. Novell plans to leverage its NetWare Management System or NDS to allocate jobs to idle processors across an enterprise network.

The primary enhancements within 4.01 have to do with NDS, and the primary NDS enhancement is faster synchronization.

In NetWare 4.0 today, when replicated portions of the directory are synchronized, the

See NetWare, *page 47*

The new IBM makes bold ATM pitch

BY MICHAEL COONEY

New York

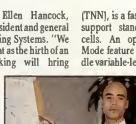
In its biggest effort to shape the network landscape since the introduction of the Token Ring, IBM last week announced a major offensive on the Asynchronous Transfer Mode (ATM) market.

As expected, IBM will offer an ATM switch, ATM local-area network hub, network interface cards and ATM chipsets, all in an effort to corner the market on high-speed networks (*NW*, July 12, page 1).

"We will be providing an evolutionary path to the revolutionary changes ATM will bring to local- and wide-area networking," said Ellen Hancock, IBM's senior vice president and general manager of Networking Systems. "We see this announcement as the birth of an era, when networking will bring entirely new dimensions to the phrase 'freedom of information.'"

Hancock said IBM is spending almost $100 million annually on its ATM development efforts.

The new ATM switch, called Transport Network Node (TNN), is a fast packet device that will support standard ATM fixed-length cells. An optional Packet Transfer Mode feature will let the offering handle variable-length packets.



Daniel Abensour of IBM

TNN offers 8G bit/sec of bandwidth, which can be increased in 8G bit/sec increments. The company would not give the switch's maximum capacity.

The device can be configured with as many as 16 250M bit/sec ports and can support ATM as well as a variety of other interfaces, including T-1, High-Level Data Link Control, Integrated Services Digital Network, Fiber Channel and frame relay. It will also support continuous bit rate interfaces for voice and video.

IBM classified the 16-port model as a middle-tier switch and said it would add larger and smaller versions in the future.

See ATM, *page 47*

Briefs

VINES reaches out to SNA. Banyan Systems, Inc. this week is expected to announce a VINES-based SNA communications server, codeveloped with Digital Communications Associates, Inc., that integrates Banyan's StreetTalk III global directory and other enterprise network services with DCA's 3270/SNA-emulation capabilities. Banyan's IBM SNA Communications Service (SCS), scheduled to ship in August, will run on a VINES for SCO Unix platform and provide 3270 terminal-emulation capabilities to DOS, Windows and OS/2 clients. SCS will support various Systems Network Architecture session types, including LU 0, LU 1, LU 2, LU 3 and LU 6.2 plus X.25 and Qualified Logical Link Control links. Macintosh client support will follow later this year.

Bell Atlantic set for frame relay. Bell Atlantic Corp. last week announced it has completed an eight-week frame relay trial with New Jersey's Public Service Electric and Gas, clearing the way for the company to offer frame relay service in portions of Maryland, New Jersey, Pennsylvania, Virginia and Washington, D.C. this month. For the trial, the frame relay network took on the utility's private-line traffic, supporting file transfers using IBM Systems Network Architecture, Transmission Control Protocol/Internet Protocol and Banyan VINES/IP protocols.

Experts to check out Skipjack. The U.S. government has selected five cryptography experts to review the proposed Skipjack classified encryption algorithm standard to assure users it is technically valid. Skipjack will be used in the Clipper Chip private-key chipset and the Department of Defense Capstone public-key system. The five experts are Ernest Brickell from Sandia National Laboratories, David Maher from AT&T, Dorthy Denning from Georgetown University, Walter Tuchman from Amperif Corp. and Stephen Kent from BBN Communications Corp. They will make their reports public July 29-30 at a meeting with the National Institute of Standards and Technology.

CA targets UnixWare management. Computer Associates International, Inc. last week signed an agreement with Univel, a partnership of Novell, Inc. and Unix System Laboratories, Inc., to port its CA-Unicenter systems management product to Univel's UnixWare network operating system.

The agreement will allow users to manage data and applications downsized from mainframes to UnixWare local-area networks. CA-Unicenter products for UnixWare will be available in about a year, CA said.

Blazing new trails. The Institute of Electrical and Electronics Engineers, Inc. last week advanced the two major proposals for 100M bit/sec Ethernet to full project status. The 802 committee also voted to create a new subcommittee for the Hewlett-Packard Co.-AT&T proposal and deferred a decision on whether the 3Com Corp.-SynOptics Communications, Inc. plan should remain in 802.3 or also be broken out into its own subcommittee. By getting its own committee, the HP-AT&T camp said a draft standard for its proposal could be reached as early as next year instead of the June 1995 time frame previously espoused.

Apple pruning its orchard. Apple Computer, Inc. last week announced a corporate reorganization, took a $320.9 million charge against earnings and began a round of 2,500 layoffs. In the new organization, the Enterprise Systems Division has been replaced by the Apple Business Systems Division, which will be divided into four areas: LAN-Based Systems; Connectivity Hardware; Open Systems Software; and Enterprise Technologies.

Contacts

ADDRESS: Network World, 161 Worcester Rd., Framingham, MA 01701. PHONE: (508) 875-6400; FAX: (508) 820-3467; INTERNET: network@world.std.com.; BBS: Interact with other readers: download free software, submit letters to the editor, leave news tips, change of address requests or hunt for jobs by using your IBM, Apple or other computer to dial into the BBS at 300 to 2,400 bit/sec (8/N/1) at (508) 620-1160 or at speeds up to 9.6K bit/sec by dialing (508) 620-1178. READER ADVOCACY FORCE (R.A.F.) HOTLINE: Contact us with story tips about pressing user issues, (800) 622-1108, Ext. 447; NETWORK HELP DESK: Contact Susan Collins via any of the above means.

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I'm looking for some information on the X12 electronic data interchange standards. Specifically, I need an electronic copy of the standards. My contacts only seem to have a hard-copy version of the standards. Can you help?

Ray Harwood, Tucson, Ariz.

Network World *contacted June Wilson, client services manager at EDI, spread the word!, an EDI publication and consulting company in Dallas. She said one option is Sterling Software, Inc.'s The EDI Eye, an EDI standards database for IBM PC/XT/AT and compatibles with at least 256K bytes of memory. The EDI Eye displays ANSI transaction sets as well as text descriptions of transaction sets, data segments and data elements.*

The EDI Eye is available on 5 1/2-and 3 1/2-inch diskettes and costs $95 plus $3.50 for shipping. You can order The EDI Eye by calling EDI, spread the word! at (214) 243-3455 or Sterling Software at (212) 752-6100.

I'm looking for a middleware product that will permit me to seamlessly access Ingres SQL files located on a Digital Equipment Corp. VAX3800 on my Ethernet backbone from within Microsoft Corp. FoxPro. Downloading an ASCII file from the VAX is not an option since I need the data in real time.

Art Stanwood, Evanston, Ill.

Tucker McDonagh, managing director of Tucker Network Technologies, Inc., a consulting and systems integration firm in South Norwalk, Conn., replies:

TechGnosis, Inc. of Burlington, Mass., provides client/server middleware solutions for connecting client and server platforms through its SequeLink software family. In a Windows environment, SequeLink is architected as Dynam-

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Windows NT finally on the way to market

BY FREDRIC PAUL

Redmond, Wash.

Just about on schedule, Microsoft Corp. plans to send the final version of Windows NT code to its manufacturing plant as early as next week. The heavily hyped network-capable operating system should quietly hit the streets within weeks after that.

"We're now on the second-release candidate for NT," said David Thacher, group product manager for NT. "This may be the one; there's a handful of bugs to be swatted and out we go." Those bugs include some hardware incompatibilities and a number of regression bugs. "You fix one thing and it busted something else," Thacher noted.

Just as important for net managers is Windows NT Advanced Server. With its centralized management, single network logons, advanced fault tolerance, remote access services (RAS), Macintosh support and enhanced multiprocessor support, the offering is running ahead of schedule and should follow NT within another week or two.

Since NT's Beta 11 release in March, Microsoft has been working on boosting performance and has added new features, including Integrated Services Digital Network support in the RAS, and File Transfer Protocol (FTP) demons.

Mike Nash, product manager for Windows NT, said the FTP demons turn NT into an FTP server in Transmission Control Protocol/Internet Protocol environments. Unix workstations can use this feature to access file-and-print services from an NT Advanced Server. "We weren't sure it was going to make the [initial product release]," said Mike Nash, a product manager for NT.

THATCHER

The most important new feature may be NWLink, a complement to the NetWare redirector client software offered by Novell, Inc. NWLink, an enhancement to the Windows Sockets common transport interface on NT Advanced Server, will let various types of workstations access NT servers via NetWare's Internetwork Packet Exchange/Sequenced Packet Exchange (IPX/SPX) transport without having to load special software onto each client. Windows Sockets previously supported TCP/IP and AppleTalk.

Even after NT and Advanced Server hit the market, users will still have to wait months for a number of key Windows NT components, including SQL Server, SNA Server and the systems management tools code-named Hermes.

SQL Server has been in a second round of beta testing at 1,500 sites since April, according to Microsoft. The firm has boosted the product's performance by allowing networks to negotiate packet sizes up to 4K bytes and enabling bulk data transfers for backup and restore operations. The offering should ship within 60 days of NT.

SNA Server will ship within 90 days of NT, promised Othniel Palomino, a product manager in enterprise services at Microsoft.

Hermes is scheduled to go into beta test in August shortly after users have final NT code, said David Berry, a product manager in Microsoft's Corporate and Networking System division. The firm hopes to ship it late in the year and is considering several pricing options.

"The first place we want NT to be a success is on the desktop," Thacher said, especially in a category he called business workstations: desktop machines running mission-critical applications, rather than personal productivity programs such as word processors.

On the server side, Microsoft hopes to target database servers running SQL Server as well as communications and management servers. With the growth of client/server computing, Thacher said, there will be more application servers than file-and-print servers.

Microsoft has scaled back sales expectations from 1 million to between 500,000 and 800,000 units in the first 12 months. Even if NT owned the entire Unix market of 1.5 million units per month, that would just about keep up with Windows 3.1. ☐

Reworking Windows for Workgroups

BY FREDRIC PAUL

Redmond, Wash.

Microsoft Corp. plans to give its slow-selling Windows for Workgroups 3.1a facelift this fall, broadening communication options, boosting performance and adding support for new network protocols.

At the same time, the company is attempting to reposition Windows for Workgroups as more than just a peer-to-peer networking solution, calling it "the ideal Windows client in a connected environment."

Both efforts seem to be a response to the market's lukewarm reception for the product, which combines the Windows 3.1 environment with a number of networking features. While users and reviewers have praised its technical design, Windows for Workgroups has been somewhat of a business disappointment, selling only an estimated 30,000 copies a month, compared to more than 1 million copies a month for Windows 3.1. Many information systems managers in large corporations have shied away from the product because of concerns about security and net control.

Rogers Weed, Windows product manager in Microsoft's systems division, said Microsoft has heard the concerns of net administrators. "We'll try to give them some comfort" with the new release, Weed said.

Code-named Snowball, it will work in all net environments compatible with Windows 3.1. Windows for Workgroups currently does not work with Artisoft's popular LANtastic peer-to-peer LAN and offers only

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limited support for 10Net, LAN Server or Pathworks nets. The new version should address those problems, Weed said.

Third-party releases have already given Windows for Workgroups the ability to work with Transmission Control Protocol/Internet Protocol, Data Link Control (DLC) protocols, Banyan Systems, Inc. VINES and SunSelect PC-NFS networks, as well as IBM's Network Basic I/O System Extended User Interface (NETBEUI) and Internetwork Packet Exchange (IPX) protocols originally included in the product.

Windows for Workgroups peer services do not work with DLC, and protect mode, which saves conventional memory, can be used only with NETBEUI connections. Third-party firms provide Macintosh client connections to Windows for Workgroups nets.

The new version of Windows for Workgroups will support industry-standard net interface card drivers.

It will include additional security and administration features — most importantly, the ability to turn on and off peer-to-peer networking, boost net performance and add remote access and facsimile support.

Windows for Workgroups costs $249, compared to $149 for the stand-alone version. Windows often comes preinstalled, and Microsoft is working on similar deals for Windows for Workgroups, Weed said.

Microsoft has also positioned Windows for Workgroups as a better network client, offering peer-to-peer services and the ability to simultaneously connect to more than one net backbone, Weed said.

Windows for Workgroups adds functionality to existing networks and makes it easier to set up, learn and use a LAN, Weed said.

But when Microsoft launched Windows for Workgroups in October 1992, it worked with only NetWare and LAN Manager. The market ignored the connectivity aspect, Weed said. "Peer to peer is only one of many bullet points."

IBM unveils additions to RS/6000 family

BY CHRISTINE BURNS

White Plains, NY

IBM last week week rolled out additions to its RISC System/6000 family that include standards-compliant file access software, systems management tools and a new low-end server.

IBM rolled out AIX/DCE Version 1.2, which incorporates the distributed file system (DFS) included in the Open Software Foundation, Inc.'s (OSF) Distributed Computing Environment (DCE), providing users with transparent access to files located anywhere on the network. Also unveiled were the AIX Performance Toolbox (PTX)/6000 and the AIX Performance Aide (PAIDE)/6000, which together enable centralized monitoring, analysis and performance tuning of RS/6000 systems.

On the hardware side, IBM delivered the PowerStation/PowerServer 34H, a low-end desktop model server, and the IBM 7135 RAIDiant Array Model 110, a high-capacity, Redundant Array of Inexpensive Disks (RAID) storage system.

With AIX/DCE Version 1.2, IBM is first to deliver DFS on top of the core DCE security, directory and timing services, components included in AIX/DCE Version 1.1 released last December.

Michael Machutt, product manager of IBM Distributed Systems in Austin, Texas, said DFS includes software that sits on both the client and the server. DFS appears to the user as a local file system, providing access to files from anywhere in the network, with the same file name used systemwide. "As long as I have permission from the owner of the file, I can get to any file on the network and not care where it is," Machutt said.

Machutt said DFS also provides system administration tools, such as automatic backup and recovery of the file system, quota-setting to limit the amount of disk space used and balancing of the file load among multiple servers.

Courtney Grey, technology manager of DCE at OSF in Cambridge, Mass., said 30 companies plan to deliver DFS products in the next year, but IBM is first out of the gate.

IBM also released Encina for AIX Version 1.1.1, a transaction processing monitor that ensures integrity for distributed transactions. Both in-house and customer stress testing on the product showed that it made 25% to 30% fewer errors than the previous version.

On the management front, IBM's PTX/6000 allows a system administrator to see a graphic view of system performance statistics from a centralized console for one or more RS/6000s attached to a Transmission Control Protocol/Internet Protocol network. An administrator could monitor up to 100 workstations from a single console.

PAIDE/6000 runs on each individual RS/6000. It provides local AIX/6000 performance statistics, such as CPU, memory and disk and network I/O, to the PTX/6000 monitoring program. It comes preset to monitor the most vital statistics of the system and can be customized to monitor others. Users can also set thresholds that, when reached, will cause PAIDE/6000 to send an alert to the management console.

PTX/6000 includes a Simple Network Management Protocol subagent that can pass statistical information to an SNMP manager such as NetView/6000.

See RS/6000, *page 7*

IBM adds to RS/6000 family

Name	Price	Available
RISC System/6000 PowerStation/ PowerServer 34H	$13,200	Aug. 6
AIX/DCE 1.2	$3,000	July 23
Encina for AIX 1.1.1	Varies with configuration	July 23
AIX Performance Toolbox/6000	$4,995	July 23
AIX Performance Aide/6000	$350	July 23
7135 RAIDiant Array Model 110	$36,750	Sept. 24
7135 RAIDiant Array Model 010	$31,190	Sept. 24

SOURCE: IBM, WHITE PLAINS, N.Y.

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Built-in net support

One prominent feature of the 6.0 releases of Informix Software, Inc.'s Informix-OnLine and Informix-Standard Engine (SE) database servers is that they will now come with built-in network support. Before, users had to buy Informix-Net for the mid-range Informix-SE databases and Informix-Star software for Informix-OnLine databases.

"Client/server is becoming so prevalent that we figured why not just build the networking in with the database server," said A.J. Brown, director of servers and connectivity marketing at Informix. The databases will now support Sockets, Novell, Inc.'s Internetwork Packet Exchange/Sequenced Packet Exchange (IPX/SPX) protocol and the Transmission Control Protocol/Internet Protocol.

Kevin Graham, manager of office systems for the Marriott Worldwide Reservation Center in Omaha, Neb., said it should make deployment easier. "I've never understood why they sell the connectivity software separately other than to make money off of it."

⇒BY BOB BROWN

Informix prepping next-generation server

BY BOB BROWN

San Jose, Calif.

Informix Software, Inc. last week did everything short of officially unveiling its next-generation database server, a network-ready offering optimized to run on symmetrical multiprocessing systems.

Informix, which plans to announce Informix-OnLine 6.0 later this year, used last week's Worldwide User Conference here to give customers a preview of the forthcoming product. The program featured five separate sessions on various aspects of the 6.0 release.

Informix-OnLine 6.0 went into beta test a month ago and will begin shipping in December on Unix platforms from Data General Corp., Hewlett-Packard Co., IBM, Sequent Computer Systems, Inc. and Sun Microsystems, Inc. Microsoft Corp. Windows NT and Novell, Inc. NetWare Loadable Module versions of the new high-end database will be available next year.

Informix-OnLine 6.0 will initially hit the market in September, when SAP America, Inc. will begin offering a version of its R/3 application software for financial management, human resources and logistics bundled with the Informix database.

The most significant feature of Informix-OnLine 6.0 is its support for symmetric multiprocessing systems, making it possible to process data in parallel. This support, based on a new multithreaded architecture, promises improved performance and scalability of Informix databases. Even though the company's databases can run on symmetric multiprocessing systems today, they cannot take advantage of multiple processors.

"Most system vendors are already selling symmetrical multiprocessing boxes, and in six months, all the major vendors will be," said A.J. Brown, director of servers and connectivity marketing at Informix. "With 6.0, our customers will be able to take full advantage of these systems." To date, there have been few applications designed to utilize the power provided by symmetrical multiprocessing systems, he said.

Informix-OnLine 6.0 includes "virtual processors," programs configured by the database administrator within the database engine to perform specific jobs, such as handling all reads/writes to a disk or intensive tasks such as sorting.

Initially, the multiprocessing support will only enable users to build database indexes, but the support will be enhanced in the first half of next year to allow for parallel data queries, as well.

The more sophisticated parallel data query capability will enable SELECT statements to be broken into components that can be handled by different processors. So one processor could scan data while another sorts it and yet another joins tables.

Brown said Informix will roll out the parallel data query capability first on the Sequent platform sometime in the first half of next year. Sequent helped Informix develop the technology for this, he said.

Informix will provide support for loosely coupled multiprocessing systems in a future release of its database. This will enable queries and other database tasks to be made against databases residing on processors distributed across a net.

David McGoveran, president of Alternative Technologies, a Boulder Creek, Calif., consulting firm, said the new Informix database system will put the vendor ahead of competitors Oracle Corp. and Sybase, Inc. in support of multiprocessing systems. The new architecture will enable Informix databases to handle more complex queries in a reasonable amount of time, he said.

Rich Finkelstein, president of Performance Computing, Inc., a Chicago-based consulting firm, said the new capability will help Informix databases handle some applications better, but I/O throughput is more often the bottleneck than lack of CPUs. ☐

CLIENT/SERVER COMPUTING

RPC tool liberates Windows applications

BY WAYNE ECKERSON

Southborough, Mass.

Start-up NobleNet, Inc. next month will ship a remote procedure call (RPC) tool kit that promises to make building Windows-based client/server applications a lot easier.

The firm, based here, will ship a Windows version of its EZ-RPC compiler that will generate RPCs in the form of Dynamic Linked Libraries (DLL), which can be accessed by Windows programs developed in any programming language. The EZ-RPC compiler will allow application developers to distribute component parts of a Windows program across DOS, Windows or Unix platforms on Transmission Control Protocol/Internet Protocol nets.

"Anyone generating Windows applications today using [Powersoft Corp.'s] PowerBuilder, [Microsoft Corp.'s] Visual Basic or any other tool can now 'client/servertize' those applications with our tool," said Dennis Ford, president and chief executive officer of NobleNet.

The EZ-RPC compiler is a high-level tool designed for application developers with little or no communications programming experience. Many RPC tools today require that developers understand much of the intricacies involved in establishing a communications link between programs across a network.

"EZ-RPC is a real breakthrough because it allows RPCs to be generated automatically and transparently [to application developers]," said John Rymer, vice president at Patricia Seybold Group, Inc., a research firm in Boston.

Developers simply describe the functions or procedures they want to distribute, such as a calculation program or file system, in a high-level specification language and then run them through the EZ-RPC compiler. The compiler spits out C code or DLLs that manage communications between client and server portions of a program and handle all data formatting tasks. The generated code does not interfere with the application source code, so developers do not have to modify or rewrite their applications prior to distributing them.

The EZ-RPC compiler currently provides client/server connectivity for applications running on most Unix platforms. It works with two widely implemented RPC libraries that are in the public domain: SunSoft's Network File System (NFS)/RPC, which is shipped in products sold by more than 300 vendors; and the Transport Independent (TI)/RPC, which comes bundled in every copy of Unix System V Release 4 and Novell, Inc. NetWare 3.11.

The initial release of the EZ-RPC compiler for Windows will work with three TCP/IP products that support either NFS/RPC or TI/RPC on DOS and Windows platforms. They are NetManage, Inc.'s Chameleon, Novell's LAN Workplace and SunSelect's PC-NFS.

EZ-RPC will also eventually support an emerging RPC standard being developed by a group of vendors led by FTP Software, Inc. that will run on top of the WinSock TCP/IP interface. WinSock is a standard application program interface for accessing TCP/IP networks via Berkeley Software Distribution's Sockets transport layer interface.

"We are positioned to be the de facto standard DOS/Windows RPC compiler," said Steve Lemmo, chief technology officer and founder of NobleNet.

Beta users of the EZ-RPC for Windows were enthusiastic. Trilogy Development Group in Austin, Texas, is using EZ-RPC to accelerate the conversion of a stand-alone application, called Sales Builder, into a client/server application.

John Eichenseer, client/server development engineer at Trilogy, said EZ-RPC saved him several months of effort in coding function calls directly to the NFS/RPC. He also said EZ-RPC can generate Unix or DLL stubs or communication code from the same specifications, which is also a time saver. "Of all the RPC tools I've used, EZ-RPC has been the most rewarding to work with," Eichenseer said.

The developers' kit for the Windows version of EZ-RPC costs $995 per developer's seat. The Unix version is priced at $4,995 for the initial Unix platform and $1,495 for a second platform. Each developer's seat costs $495. Neither version charges run-time royalties.

©NobleNet: (508) 460-8222.

CORRECTION

The Vendor View "Sifting through the internet options" in LAN World June 28 (page L12) should have been attributed to Ungermann-Bass, Inc. The article was authored by Soni Jiandani, product-line manager, and Mick Scully, general manager of the Intra/Internetworking Business Unit.

VENDOR VIEW

USL's RPC technology

Unix System Laboratories, Inc. (USL) will bundle remote procedure call (RPC) technology from NobleNet, Inc. into future releases of Unix System V to make the operating system more suitable to client/server development.

Future releases of Unix System V will contain an EZ-RPC run-time library that lets RPCs handle more complex data types, enabling Unix System V customers to convert existing C programs into client/server applications without having to recode or redesign the application, USL officials said.

Specifically, the EZ-RPC run-time library contains extensions to the External Data Representation (XDR), which is a standard for formatting data to be sent across a link.

"XDR limited the ability of [Transport Independent]/RPC from becoming a ubiquitous tool for building client/server applications because it couldn't handle complex data types," said Dennis Ford, president and chief executive officer of NobleNet.

⇒BY WAYNE ECKERSON

DEC upgrades DECnet/OSI and enhances OSI tool kit

Fosters tighter integration between DECnet, OSI stacks.

BY JIM DUFFY

Maynard, Mass.

Digital Equipment Corp. last week upgraded its DECnet/OSI software for OpenVMS and OSF/1 platforms to make it easier to migrate DECnet Phase IV users to DECnet/OSI.

At the same time, DEC unveiled an enhanced Open Systems Interconnection application developers' tool kit as well as software that allows its new Alpha systems to connect to X.25 networks.

The enhancements are intended to make the migration to DECnet/OSI less painful and less costly for DEC's installed base of Phase IV users. They are also designed to more tightly meld DEC's systems into open networking environments.

Open to migration

Product	Price	Available
DECnet/OSI for OpenVMS 5.6	$485 to $22,000	Now
DECnet/OSI for DEC OSF/1 AXP 1.1	$1,200 to $11,667; extended license: $1,500 to $14,584	August
OSI Application Developer's Toolkit 2.0	$7,000	Now
DEC X.25 Client 1.0	$775 to $7,750	Now

SOURCE: DIGITAL EQUIPMENT CORP., MAYNARD, MASS
GRAPHIC BY SUSAN J. CHAMPENY

For the OpenVMS environment, DEC rolled out DECnet/OSI Version 5.6 for OpenVMS VAX. The software, which allows DEC's VAX systems to function as end nodes, features tighter integration between the DECnet and OSI protocol stacks.

The first four layers of the DECnet and OSI protocol stacks — physical, data link, network and transport — are now integrated into a single stack, said Mary Ellen Fortier, DEC's Advantage Networks marketing manager. Previously, the stacks were only integrated up to the network layer.

The additional layer enables existing DECnet applications to use OSI transport mechanisms — TP0, TP2 and TP4 — when communicating to an OSI end node, Fortier said.

"All users of DECnet Phase IV that are looking to migrate to OSI can easily run their DECnet Phase IV applications over DECnet/OSI," Fortier said.

Version 5.6 also boasts an extended system option that allows users to configure DECnet/OSI nodes as DECdns distributed name service servers, meaning DECnet applications can refer to them to locate resources on a DECnet/OSI network. The option includes gateways for translating data from DECnet file transfer and terminal-emulation applications to OSI file-transfer and terminal-emulation formats and vice versa.

The extended system option also features cluster alias support. Version 5.6 supports Version 2.0 of the U.S. Government OSI Profile.

Meanwhile, DECnet/OSI for DEC OSF/1 AXP Version 1.1 allows DEC Alpha systems to act as end nodes in DECnet/OSI networks.

Version 1.1 has a number of new features not present in Version 1.0, including support for the Internet Engineering Task Force's Request For Comment (RFC) 1006. RFC 1006 allows DECnet/OSI users to run OSI applications on top of Transmission Control Protocol/Internet Protocol transport protocols.

Version 1.1 also supports OSI File Transfer and Access Management (FTAM) and Virtual Terminal Protocol applications, which enable DECnet/OSI users to engage in file transfer and terminal emulation with any system on a DECnet/OSI or native OSI network. An extended system facility translates data using those applications to and from proprietary DECnet formats.

DEC's OSI Application Developer's Toolkit, meanwhile, allows users to write distributed applications that communicate over an OSI network. Version 2.0 of DEC's tool kit ships with a compiler that previously had to be purchased separately for about $15,000, DEC's Fortier said.

The compiler helps reduce the time needed to write applications by removing some of the coding routines needed for development. And by including the compiler with the tool kit, DEC is reducing the cost of writing those applications, Fortier said.

Lastly, DEC's X.25 Client Version 1.0 for OpenVMS AXP systems runs on Alpha systems under the OpenVMS operating environment and connects those systems — and local-area networks if the DEC system resides on a LAN — to X.25 packet-switched data nets.

✆DEC: (800) 344-4825.

RS/6000

Continued from page 5

IBM's newest RS/6000, PowerStation/PowerServer 34H, is part of the low-end RS/6000 300 series. The firm claims the 34H has a 37% increased performance rate over the other models in the series.

Among the 34H's vital statistics are a 41.6-MHz processor; 16M bytes of memory, expandable to 256M bytes; 400M bytes of internal disk storage, expandable to 4G bytes; and four available Micro Channel Architecture slots. The memory cache of the 34H is 32K bytes, up from 8K bytes available in previous models. IBM has priced the 34H at $13,200, which is $6,500 less than comparable IBM low-end servers.

Frank Drubeck, president of Communications Networks Architects, Inc., a Washington, D.C. consultancy, noted the performance improvement of the 34H over its family members but said the drop in price will be the deciding factor for users. "IBM has in the past covered the niche of providing a low-entry server product, but it was never covered at the right price point," said Drubeck.

The IBM 7135 RAIDiant Array Model 110, introduced by IBM's ADSTAR storage unit, can accommodate any combination of RAID 0, 1, 3 and 5 concurrently. It includes 2.6G bytes of disk storage and can be expanded to a maximum capacity ranging from 39G bytes to 60G bytes. The components are all hot-pluggable and can be easily replaced.

ADSTAR also released RAIDiant Array Model 010, an entry-level model for non-RAID requirements that provides up to 4G bytes of Small Computer System Interface storage and can be expanded to a maximum capacity of 24G bytes. The Model 010 is field-upgradable to the Model 110.

Chris Wood, manager of architecture planning and business development at ADSTAR, said the 7135 is a high-capacity, 100%-redundant array for users that need high data protection and the ability to build high-capacity systems in a relatively small rack. It is ADSTAR's first general-purpose RAID product for the RS/6000.

✆IBM: (800) 426-2468.

Novell to head LAN security movement

BY CARYN GILLOOLY

New York

As expected, Novell, Inc. teamed with a host of other companies here last week to announce an effort to create secure network environments composed of multivendor products.

The Trusted Network Computing Environment model the companies devised has at its core Novell's NetWare 4.X network operating system, which provides server security through use of the NOS' directory, authentication, auditing and encryption capabilities. Within the model, third-party vendors such as Cordant, Inc. will provide the client-side and additional server-based security pieces to help build trusted local-area net environments.

JAROCKI

As a basis for the model, Novell has submitted a NetWare 4.0-based network — which uses Cordant's Assure hardware to safeguard network clients — to the National Computer Security Center (NCSC) and the European Commercial Licensed Evaluation Facilities for C2 and E2 security evaluations, respectively [*NW*, July 12, page 1).

C2, as defined by the Department of Defense's "Red Book" of trusted systems evaluation guidelines, primarily certifies that a system offers a defined level of discretionary access control, as well as user identification and passwords. The NCSC guidelines range from a high security rating of A to a low security rating of D. E2 ratings are roughly equivalent to C2 ratings.

Novell said it also plans to offer a security application program interface (API) to let other vendors write applications that run within the C2/E2 compli-

ant environment. Third parties that came out in support of the API included AT&T, Computer Associates International, Inc., Datamedia Corp. and Semaphore Communications Corp.

Novell has also formed the Industry Advisory Group and the security Special Interest Group — to help in developing the Trusted Network Computing Environment.

The announcement lacked specifics or product details. Some, in fact, said it was "all hype," claiming Novell did little more than put NetWare up for a security evaluation.

But for users looking to downsize mission-critical applications from mainframes to LANs, product specifics were not important.

"We're a large user," said Stanley "Stash" Jarocki, vice president at Citibank, N.A. in New York. "The question is, could we use NetWare in the future without this [security push]? The answer is no."

Novell, Cygnus to broaden apps spectrum

BY CARYN GILLOOLY

San Jose, Calif.

Novell, Inc. last week added another plank to its application development platform, saying it will work with Cygnus Support to develop a Unix-based developers' kit for NetWare Loadable Modules (NLM).

The tools — based on Cygnus' existing GNU product — will let Unix developers write NLMs from within their native Unix environments, whereas NLMs can currently only be developed within DOS or OS/2.

"To date, most applications have been developed to run on an Intel [Corp.] platform because that's where NetWare is," said Michael Tiemann, president of Cygnus, based in Mountain View, Calif.

It will also be possible to recompile programs developed using the GNU tools for NetWare to run on other platforms, including Microsoft Corp. Windows, DOS, OS/2 and Apple Computer, Inc.'s Macintosh.

"This lets you author the NLM in the Unix environment, then output the NLM to other platforms," said Willie Tejada, director of developer relations for Novell here. "This way, you only have to write NLMs once, regardless of how many platforms you want to write them for.

"We're not discouraging building applications for specific platforms," Tejada continued, "but if you want to deploy those applications across multiple platforms, you can use the GNU tools."

The tools are a set of utilities that consist of a C compiler, a C++ compiler, an assembler and a debugger.

Once the NetWare version of the package is available, it will become a part of the core GNU tool offering, as well.

On the Novell side, the GNU tools for NetWare will be included in Novell's free, announced AppWare developer products, including the NLM Software Developers Kit.

It will also ship within Novell's Processor Independent NetWare Software Development Kit when that becomes available.

The NetWare-enabled GNU tools will be available in the first quarter of next year. Pricing has not been set.

✆Novell: (800) 638-9273.

Network General's new SIS sniffs out problems

BY SKIP MACASKILL

Menlo Park, Calif.

Network General Corp. last week rolled out a distributed network analysis tool that can automatically detect problems across multiple segments of a high-speed internetwork.

The Sniffer Internetwork Server (SIS), the latest addition to the company's Distributed Sniffer System (DSS), is a 486-based device that lets net managers troubleshoot local-area network internets comprising T-1 and E-1 leased lines, frame relay connections and X.25 circuits at speeds of up to 2.048M bit/sec.

"With SIS, we're doing a variation of the Expert Sniffer Internetwork Analyzer that we announced in January," said John Lenko, product marketing manager of DSS at Network General. "The advantage is that from a central console, the user can look at their internetwork connections at the same time they are monitoring their LAN connections."

The Internetwork Analyzer did not support internets that included more than one router hop, meaning only one network segment could be handled at a time.

SIS features Network General's Expert software, which can automatically detect potential problems — such as slow file transfers, misconfigured routers and broadcast storms — before they cause network crashes and downtime.

The Expert software learns network configurations, connections, device names and routing paths in real time, interpreting the raw data into useful information that allows the net manager to take proactive measures. SIS automatically sends alarms about potential problems to a SniffMaster Console, which adds analysis information from the Expert software and presents it to the network manager.

140%

According to Infonetics Research, Inc., the number of internetwork devices in an average user's LAN internet is expected to increase by a compounded annual rate of 140% from 1991 to 1995, while net staff levels should only increase 10%, highlighting the need for better management tools.

10%

Assessing bandwidth utilization is one of SIS' biggest benefits, according to Lenko.

"About 85% of internetwork costs are typically bandwidth related because users are jamming as many protocols across a single WAN link as they can," he explained. "It's difficult to get a grip on how efficiently the bandwidth is being utilized. SIS does that for them."

SIS can analyze more than 140 protocols at all seven layers of the Open Systems Interconnection model and provide automatic decodes of proprietary High-Level Data Link Control frame formats used by several major bridge/router vendors.

SIS is currently available in two versions. The Ethernet version is priced at $8,495, while the other, a token-ring model, is priced at $9,495.

©Network General: (415) 473-2000.

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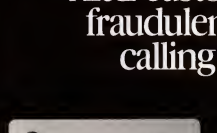

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Circle Reader Service #13

RBHCs ask FCC for guidelines

BY BILL BURCH

WASHINGTON, D.C.

In a petition that relies on market research and a fair measure of audacity, five regional Bell holding companies last week asked the FCC to begin setting guidelines for their entry into long-distance service.

Bell Atlantic Corp., BellSouth Corp., Nynex Corp., Pacific Telesis Group and Southwestern Bell Corp. told the commission it should grant the petition in light of increasing competition in the local loop and for the sake of fostering long-distance competition.

"Given the rapid pace of change in the telecommunications industry, the we.k a.ked.theinter-LATA prohibitions will be removed," the group told the FCC. "The question is not whether the commission must act on this matter but simply when it will do so." The Federal Communications Commission would say only that it was reviewing the petition.

Of the seven RBHCs, only US West, Inc. is not pursuing long-distance service at this time. The FCC already has a separate petition pending from Ameritech requesting permission to

See RBHCs, page 46

BRIEFS

Racal-Datacom, Inc. last week rolled out the Multivendor Integration Toolkit, a suite of network management products and services that ease the integration of non-Simple Network Management Protocol systems and non-Racal-Datacom devices into its CMS 6000 net management system, allowing users to monitor their entire network from one platform.

The basic tool kit includes an event format definition application and an alarm integration module that processes all events and alarms into a standard reporting format. The advanced version allows Unix and C programmers to customize management modules for non-Racal-Datacom devices.

The Multivendor Integration Toolkit will be available in September, with prices starting at $15,000.

Racal-Datacom: (305) 846-1601.

Nynex Allink Co. last week brought out a new version of the Allink Operations Coordinator (AOC), a high-end umbrella network management system.

Release 3.0 of the AOC allows the Nynex system to exchange management information with Hewlett-Packard Co. OpenView platforms and Sun Microsystems, Inc.'s SunNet Manager. Also, the AOC's graphical display is now based on the Open Software Foundation, Inc.'s Motif interface.

Meanwhile, the AOC's database can store managed elements that conform to industry standards, such as the Network Management Forum's OMNIPoint specification.

Nynex Allink said it plans to port AOC to HP and IBM systems, including the RISC System/6000, in the future.

AOC Release 3.0 is available now. Prices range from $33,000 to $88,000.

Nynex Allink: (914) 644-7798.

Optical Data Systems, Inc. last week penned an agreement with **Sync Research, Inc.** to integrate Sync's SNA Network Access Controller module into the ODS Infinity hub.

The ODS 1094-SR, which performs Synchronous Data Link Control-to-Logical Link Control conversion, is available now in two- and four-port models, both equipped with token-ring, RS-232, V.35 or X.21 interfaces. Pricing starts at $3,995.

ODS: (214) 234-6400; Sync Research: (714) 588-2070.

Rockwell International Corp.'s CMC Network Products Division last week unveiled Version 1.2 software for its NetHopper dial-up router that will help users control telephone line usage by setting alarm points based on specific quotas. When the thresholds are met, the NetHopper can either send an alarm message to an attached console or automatically disconnect the telephone line.

The new software is available now as a free upgrade to existing NetHopper users.

Rockwell: (800) 262-8023.

INTERNETWORKING VENDORS

Proteon CEO faces uphill battle to regain prominence

Q&A

1992 was not a good year for Proteon, Inc. By year end, the router vendor saw its revenue plummet 12% from the previous year's fourth quarter, prompting the company to cut its work force by nearly 15%.

Once considered one of a select group of vendors capable of commanding a significant share of the fast growing and lucrative internetworking market, Proteon's star suddenly lost its luster while key rivals such as Cisco Systems, Inc. and Wellfleet Communications, Inc. enjoyed record earnings during the same period.

Patrick Courtin, president and chief executive officer of Proteon, recently spoke with *Network World* Senior Editor Maureen Molloy about his company's fall from grace and the uphill battle it faces in its efforts to regain prominence, particularly in the IBM internetworking market.

Proteon was long considered a strong player in the internetworking market, but earlier this year, it became obvious that the company had faltered. Analysts began talking about Proteon as a company with good products that had been outmarketed by competitors in almost every product segment. Is that a fair assessment?

Yes, but that's changing. The unfortunate situation we saw in Q1 that led to lost earnings was primarily based on the fact that we had several partners who, for individual reasons, didn't meet their forecasts. We made the mistake of relying too heavily on their judgment.

The challenge we faced was that the information we were getting from some of our partners was not necessarily as accurate or as precise as we would have liked. That wasn't the only reason we saw losses in Q1, but it was the main reason, and it's forced us to take drastic measures to turn the company around.

What are some of those measures?

We began a new program nine months ago called Direct Presence, where we promote Proteon through seminars, telemarketing, advertising and all the normal promotional channels in order to get more in front of those end users and to communicate directly with them. But we're still working very closely with our key partners like [Digital Equipment Corp] and [Motorola Codex].

We need to continue to boost our direct presence and to ensure we put much more effort

Patrick Courtin of Proteon

See Proteon, page 16

IBM's APPC travels long route to success

BY MICHAEL COONEY

As IBM moves closer to true peer-to-peer networking, no technology is a more important building block than its APPC.

Introduced in 1982, Advanced Program-to-Program Communications was designed to move IBM applications from the hierarchical master/slave mainframe environment to one in which applications could communicate as peers, no matter where they resided in the network.

IBM defines APPC as a set of functions and calls that make up the application program interface to LU 6.2 sessions; in everyday usage, the two terms have become virtually synonymous.

APPC is implemented in software and enables high-speed communications between software programs on different computers — from portables and workstations to mid-range and mainframe host computers — with either machine capable of initiating an APPC session. Simply put, APPC/LU 6.2 serves as the peer-to-peer data carrier between applications on the network.

This is a major contrast to the 3270 hierarchical world, in which only a mainframe could initiate sessions and all data had to travel through the mainframe. Plus, unlike 3270-based programs, APPC applications can communicate with multiple other applications simultaneously.

IBM's preferred high-level programming interface to APPC/LU 6.2 sessions is known as the Common Programming Interface for Communications (CPI-C). Other interfaces, such as remote procedure call and the Message Queuing Interface can also be used to write APPC/LU 6.2 applications.

CPI-C is part of IBM's Systems Application Architecture, which spells out how the company will port applications across its own OS/2, OS/400, VM and MVS operating systems. Together, CPI-C and APPC support peer-to-peer application services and synchronize

See APPC, page 16

Gov't backs off on DSS patent battle

BY ELLEN MESSMER

Washington, D.C.

Confronted by claims that its proposed Digital Signature Standard (DSS) violates technology patents, the federal government is giving up rather than fighting — and possibly losing — a lengthy court battle.

The National Institute of Standards and Technology (NIST) is admitting defeat in the two-year dispute it has had over DSS with Public-Key Partners (PKP), the patent holder for RSA Data Security, Inc.'s public-key encrytion technology, and German mathematics professor Claus Schnorr, who claims DSS is a copy of the digital signature algorithm he invented.

As a result, industry will not be able to implement DSS for free, as the government had long promised, but will have to license the technology from PKP, which now represents Schnorr, as well.

"NIST came back to us and said, 'You're right, you have patent coverage,'" said Jim Bidzos, president of RSA and a partner in PKP. "We have fought with them, and we have prevailed."

Public-key digital signatures can be used to "sign" electronic documents as well as to verify that a document's contents have not been altered before reaching the recipient over a network.

NIST is expected to approve terms that would require vendors to pay 5% in royalties to Sunnyvale, Calif.-based PKP for any DSS software products sold

See Patent, page 12

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Firms want Internet access to SEC's Edgar

BY JIM DUFFY

Washington, D.C.

A number of Internet service providers are pressing the Securities and Exchange Commission to provide access to the Edgar electronic filing system through the Internet, claiming it would make it cheaper and easier to retrieve financial information on publicly traded companies.

Edgar, which stands for Electronic Data Gathering, Analysis and Retrieval, is an electronic SEC document filing system designed to eliminate most of the 10 million pages of financial documents companies submit to the regulatory agency each year. The financial data, such as proxy statements and 10-K forms, is intended to be accessed by individuals for investment purposes. Edgar became operational in April, two years later than planned and $20 million over budget.

Currently, the SEC has a contract with The Mead Corp.'s Mead Data Central for the dissemination of Edgar filings via "wholesale" dumps of bulk data to net service providers. The dumps involve gigabytes of data and require multiple T-1 lines, said David Copenhafer, director of the SEC's office for systems support.

As the plan was originally envisioned, these service providers would then act as retailers and sell the information to the public, along with other "value-added" services, such as annotation and repackaging. To date, however, no service providers have signed on to take the Edgar dumps, said Jeff Duncan, a spokesman for the Committee on Energy and Commerce's Subcommittee on Telecommunications and Finance.

Individual investors have to receive the dumps directly to receive Edgar data on-line.

Such disseminations could be made available inexpensively via the Internet using electronic mail and the File Transfer Protocol, the networking companies claim.

Individuals only need a modem and a dial-up line to gain access to the Internet through a network service provider, which provide Internet access for a fee.

Edgar system

1984 Planning for Edgar begins.

1996 Nearly 15,000 companies will use the system to file documents with the Securities and Exchange Commission.

Ten companies drafted a letter in May to Rep. Edward Markey (D-Mass.), who is the chairman of the Subcommittee on Telecommunications and Finance, proposing that the SEC look into public access to Edgar via the Internet.

The SEC responded to the letter in June by stating that it is technically feasible to provide Edgar filings over the Internet. The regulatory body also estimated a start-up and maintenance cost for that provision — $775,000 for start-up and $400,000 per year for maintenance. But the SEC is considering other less expensive alternatives.

"We're still in the very early stages of information dissemination," the SEC's Copenhafer said. "We did spend a lot of time working with Congress to develop the structure that is in place. At this point, we'd like to see whether or not it meets the needs of everyone before we start tinkering with it."

Duncan said, "We're optimistic that Edgar will get on the Internet in some form."

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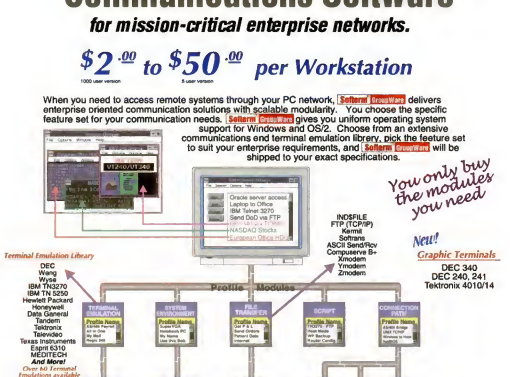

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Circle Reader Service #18

Patent

Continued from page 9

to commercial, private-sector users. When the DSS product price exceeds $1,000, the royalty rate would drop to 1%. No royalties will be required for DSS products sold to the federal, state or local government sectors.

Once an agreement is signed with PKP, NIST will issue DSS as a mandatory standard, said Lynn McNulty, associate director for computer security at NIST.

In a face-saving arrangement, NIST is declaring it is "granting an exclusive worldwide license to PKP" for the Digital Signature Algorithm in DSS.

"For the sake of getting on with the job, the government agreed to the cross-licensing scheme," McNulty said. "The underlying goal is to break the legal logjam."

McNulty noted that the Department of the Treasury and its Internal Revenue Service division have the most ambitious plans in government for DSS. The Treasury Department would like to receive routine information from financial institutions using DSS. By the year 2000, the IRS would like to receive electronic

See Patent, page 16

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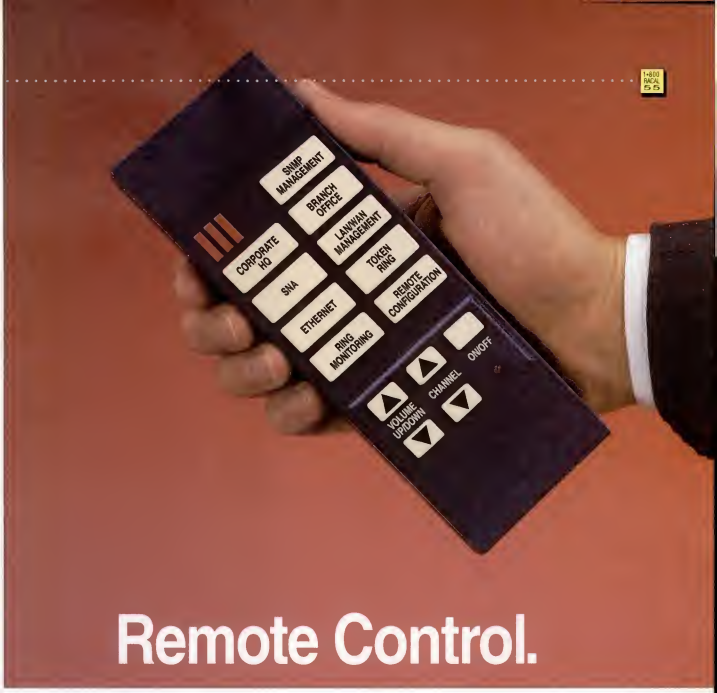

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Patent

Continued from page 12

tax forms from every taxpayer using the DSS, which may be widely implemented in tax software packages.

Another reason to resolve the patent dispute is that the same Digital Signature Algorithm and key management system used in DSS is also used in Capstone, the hardware-based public-key encryption system to be deployed in the military's next-generation network, the Defense Message System (DMS). A request for proposal for that system will be released this fall.

BIDZOS

Capstone uses the same key-escrow system as the private-key system President Clinton is backing as a standard.

Under the terms of the deal now under negotiation between NIST and PKP, vendors will pay 2.5% royalties to PKP on each Capstone chipset sold to any nongovernment user.

"Subject to seeing the details, in principle, a resolution of this controversy will have significant benefits to the public and the U.S.," said Michael Baum, an attorney specializing in electronic commerce and security at Independent Monitoring in Cambridge, Mass.

The deal being struck between PKP and NIST goes beyond just DSS and Capstone. It would cover all commercial services that certify digital signatures through the means of a digital certificate (NW, July 12, page 11).

According to terms proposed by PKP, any commercial service certifying a signature's authenticity for a fee will be allowed to operate royalty-free for the next three years but thereafter will have to pay PKP a royalty of $1 per certificate. This could spell a bonanza for PKP's partners, which include Stanford University, the Massachusetts Institute of Technology and the scientists who invented the technology.

However, some vendors are angry that DSS is not going to be available for free as NIST Deputy Director Ray Kammer said it would be when he announced DSS in July 1991.

Plans under way in the telecommunications industry to implement DSS for software updates in switches and authenticate the identity of maintenance personnel, and new end-user services, are now on hold, said one source who requested anonymity.

Proteon

Continued from page 9

into promoting Proteon in front of the end user, which is very different from how we've operated in the past.

We also looked at our end-user business and how they're purchasing our products and saw two general business dynamics. As a result, we reorganized the company and divided it into two operating divisions.

One is the LAN Products Division, which corresponds to the sale of our token-ring adapter cards and low-end hubs. It's a distribution-oriented business, and it will focus on being very competitive from a price standpoint.

The second is our Internetworking Systems Division, which will focus on our high-end hub and router products. It's much more systems-oriented, where we will have a direct presence at the end-user site to help them build their enterprise networks.

I will by no means say the company has turned around — it's too early to tell — but we now have a structure in place that leads to increased momentum.

Cisco, CrossComm Corp., IBM and Wellfleet are on many users' short list when deciding among vendors to provide their Systems Network Architecture internetworking solution. Given Proteon's early entry and success in the IBM Token-Ring market, why isn't your company on that short list, too?

We are having an increasingly strong presence there. We already have a strong presence in general IBM-like end-user shops based on our token-ring expertise. But in terms of internetworking, we didn't have the focus on that market that we're starting to have now.

Our latest DNXi router is focused on SNA. And our Internetworking Traffic Management [PITM, which is software announced last winter that lets users assign up to 40 priority levels for SNA and non-SNA traffic] is also targeted at the SNA user.

We recently advertised a number of new positions because we need employees to help us grow in the domains we want to win at — such as SNA internetworking — and to help us build a strong direct presence, another key requirement for our future success.

That stronger focus we're putting together is starting to pay off for us. Soon you will start to see Proteon popping up a lot more in the [requests for proposal] of key end-user organizations.

What advantages can Proteon provide to those SNA users, as compared to other router vendors?

We can provide guaranteed response time on SNA sessions via PITM. That's unique and gives the user the ability to guarantee point-to-point session availability between the mainframe and terminal through our routers.

Other vendors have similar capabilities, but some don't have features that let the user do more than advanced bridging in that SNA domain. CrossComm, for instance, has good advanced bridging capability at the NETBIOS and SDLC levels. But when you start talking about mixing and matching a multiplicity of protocols and coexisting with SNA, CrossComm doesn't have an offering.

We let users balance all their protocols on the wide-area connection and maximize the guaranteed response for all those routed protocols.

But Cisco and Wellfleet, for example, will soon improve their respective prioritization schemes. Where do you see Proteon's long-term edge, particularly over those two heavyweights?

Cisco's strategy, for one, is very much targeted at displacing some of the IBM equipment with Cisco routers — the front-end processor, in particular. Proteon, on the other hand, is trying to be a lot more amicable to the IBM world and coexist with it to provide the end user with a migration path that's both flexible and realistic.

What you want to do for users is to continue managing the assets they already have and, over time, evolve it to a multiprotocol environment. That's Proteon's strength, and I believe we're making headway in providing coexistence within standards between the SNA world and the non-SNA world.

Many industry observers have lately been pointing to a so-called shakeout in the router market, claiming that there'll be only a handful of router vendors still kicking three years from now. Do you agree?

For the most part, yes. When you step back, you can see that routing is a technology that's extremely software-intensive. Very few vendors will have the ability to provide the continuous evolution of that software.

The low end could be a bit different because you have a much more focused and tailored offering where the user requirements are fairly simple: one or two protocols, for example. But at the high end, you'll see the evolution of software enhancements continue, and there's a limited number of vendors capable of pushing it forward and providing the full spectrum of advanced capabilities. I fully expect Proteon to be one of the few vendors that can.

IDEA adds Windows support to gateway

BY MICHAEL COONEY

Billerica, Mass.

IDEA last week introduced its first IBM Application System/400 gateway designed for Windows users.

The new IDEAcomm Gateway 5250 for Windows consists of software and an intelligent adapter card that works with Intel Corp.-based personal computers with Extended Industry Standard Architecture and Micro Channel Architecture buses. It also includes 5250 emulation software for Windows-based PCs linked to the gateway.

Locally, the gateway supports as many as 128 concurrent users. It supports up to four Synchronous Data Link Control or X.25 links to the AS/400 at speeds up to 64K bit/sec. Each SDLC or X.25 line requires a separate intelligent adapter card. The gateway supports RS-232, V.35 and X.21 interfaces.

"The gateway resides on a token-ring LAN and lets users gain simultaneous access to 5250 applications on the AS/400, and Windows applications on their PC or local server," said Luis Haddock, product manager for the IDEA gateway.

Users can hot-key between Windows and AS/400 applications without having to log off one application to get to the other, as is the case with IDEA's DOS AS/400 gateways, Haddock said. By supporting Windows Dynamic Data Exchange, the gateway will also let users cut and paste data between 5250 and Windows applications.

The new package eliminates the need for IBM's resource-hungry PC Support PC emulation program, Haddock said.

"Our product can work with PC Support, but we don't require it for connectivity with the AS/400," he said.

The firm has had DOS-based 3270 and 5250 gateways in the past, and sources familiar with the company said IDEA will add 3270 support to the Windows gateway, probably by the end of the summer. Haddock did not confirm nor deny that the enhancement would be forthcoming.

IDEAcomm Gateway 5250 for Windows is available at prices ranging from $3,495 for an eight-user license to $8,495 for a 128-user license.

© IDEA: (800) 257-5027.

APPC

Continued from page 9

program processing among distributed platforms.

CPI-C plays an important role for APPC/LU 6.2 in that it provides a level of standardization that is currently lacking. Vendors have implemented APPC with proprietary interfaces and features, creating confusion and numerous APPC applications that cannot communicate with one another. In years past, IBM admits, it didn't help much in solving the problem.

"In the beginning, we did real good showing and explaining to users how LU 6.2 worked, but we gave them no clue how to use it. We were dumb," said one IBM executive at a trade show last year.

IBM isn't dumb anymore, however. Now the company has open forums, such as the CPI-C Implementors Workshop and the APPC/APPN Platform Developers Conference, to solicit third-party APPC development directions. It also formed the APPC Market Enablement group in Raleigh, N.C., devoted to the promotion and implementation of APPC.

It is important for IBM to get APPC firmly entrenched in user networks because the technology is one of the cornerstones upon which the company is building its current and future communications architectures.

For example, it is the key building block of IBM's Distributed Relational Database Architecture that defines how IBM and non-IBM databases will exchange data seamlessly. It is also the basis for IBM's Advanced Peer-to-Peer Networking technology, which defines how IBM intends to build enterprise-wide peer-to-peer networks.

APPC and CPI-C are now supported in applications and connectivity products from more than 40 vendors, from Amdahl Corp. to Unisys Corp. And the X/Open Company, Ltd. standards organization has adopted CPI-C as the strategic open interface for its Common Applications Environment.

APPC/LU 6.2 also has the benefit of being useful in both local- and wide-area environments.

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Surveying interest in APPC

LAN WORLD

A Special Monthly Section for Lan Decision Makers

INVERTED BACKBONES

Turning the backbone inside out

BY SKIP MACASKILL

Concurrent with corporate efforts to downsize critical applications to network environments is an effort to centralize management and control of the expanding realm. It is difficult to do the former without the latter.

To achieve that control, many users are redesigning their local-area networks by installing inverted or collapsed backbones that make it possible to centrally locate equipment such as servers and key internetworking devices.

The centralized architecture offers several advantages over the more traditional distributed approaches, where internetwork functionality is dispersed throughout the network.

"Users are relying more and more on LAN applications to meet business goals, so net uptime is more critical and has led to the need to centrally administer the various work groups in an organization," said Janet Hyland, director of network strategy research at Forrester Research, Inc.

In a collapsed backbone, all subnetworks

See Backbone, page L8

Evaluating Novell's new AppWare plan

BY MARK GIBBS

Building applications is hard -- hard because you make lots of mistakes and it takes a long time.

Building network applications is damn hard. Not only do you have all the problems of the stand-alone environment, but you also have the issues of handling communications, accessing services, controlling complex events and coordinating operations with other network users.

The difference between stand-alone applications and network applications is about the same as the difference between building a biplane and building a Stealth bomber.

So it's not surprising that this difficulty has inhibited the development of network-compatible applications. Nor is it surprising that Novell, Inc., the leader in the local-area network market, should be interested in making the development of network applications easier.

With the recent announcement of AppWare, Novell has launched its biggest assault on the network application development market yet.

In a nutshell, AppWare: Is an integrated applica-

See AppWare, page L8

Banyan CEO Mahoney details enterprise network landscape

Discusses the looming threat of NetWare 4.0 and Windows NT.

Q&A Banyan Systems, Inc. built a $113 million fortress in the high end of the local-area network market by providing directory services that simplify the creation and management of large networks.

But Novell, Inc. is now storming the gates with NetWare 4.0 and NetWare Directory Services, and Microsoft Corp. is a threat waiting in the wings with Windows NT.

Company Chairman and Chief Executive Officer David Mahoney discussed the enterprise network landscape and competitive pressures with *Network World* Executive Editor John Dix and Staff Writer Christine Burns at Banyan's headquarters in Westborough, Mass.

MAHONEY
Chairman and CEO
Banyan Systems, Inc.

How does your sales pitch to Fortune 500 companies differ from that of Novell and Microsoft?

Within organizations, there are two types of decision making: top down and bottom up. The ones that are bottom up have departments that made a decision to buy an application and put it on a network or put a small network in place to share peripherals and then decided to expand it. Novell and Microsoft have had a long-standing presence there primarily because their products have been marketed and sold through the same channels as PCs.

Our business is more directed at the top-down decision making. In 1984, when we first put salesmen on the street, they were calling on [information systems] executives and introducing them to our concept of networking.

Our strength has always been our ability to link work group network environments, historically work groups using our own products. Looking [to the future], our ability to tie together work group environments that have been created using other vendors' products is equally important. Enterprise Network Services for NetWare, a product we announced last

See Banyan, page L6

Novell releases SNMP developer's kit

BY CARYN GILLOOLY

San Jose, Calif.

As expected, Novell, Inc. last week took the first steps toward embracing the Simple Network Management Protocol standard with the release of Version 2.0 of its NetWare Management System (NMS) Software Development Kit (SDK).

The kit will let developers build SNMP-based desktop and server applications for NetWare environments. This is the first move toward allowing NetWare to be managed by any vendor's SNMP management system (*NW*, June 28, page 1).

Before this release, NetWare-based resources built using Novell's proprietary MSAPI application program interface could only be managed by the vendor's management system.

There are four primary pieces to the new SDK, according to Navindra Jain, vice president and general manager of Novell's Network Management and Internetworking Products Division here. The first is the new NetWare server Management Information Base (MIB). The NetWare MIB specifies how a NetWare server is to be managed by an SNMP-based management application.

For example, it gives the administrator the ability to access server statistics from any SNMP-based management console. It will provide basic server and network adapter configuration information, user login status and account information, print queue and job statistics, as well information on the NetWare Loadable Modules installed in the

See SDK, page L12

BRIEFS

Hewlett-Packard Co. this week will unveil HP Windows Client, a diskless personal computer designed for Novell, Inc. NetWare and Microsoft Corp. LAN Manager environments. It downloads Microsoft's Windows operating system and Walker Richer & Quinn, Inc.'s Reflections terminal-emulation software from local-area network servers to allow users to engage in multiple sessions with HP and Digital Equipment Corp. hosts. The product starts at $895. It will ship this month.
HP: (800) 752-0900.

Cabletron Systems, Inc. last week rolled out the TPT-D4, a dual-port, redundant 10Base-T transceiver for fault-tolerant Ethernet links. The device provides the ability to create redundant shielded or unshielded twisted-pair links to safeguard mission-critical paths.
Available now, the TPT-D4 costs $445.
Cabletron: (603) 332-9400.

Synernetics, Inc. last week announced the Fiber Distributed Data Interface Concentration Module-Twisted Pair, a new FDDI module for its LANplex 5000 intelligent switching hub that supports 100M bit/sec links over Category 5 unshielded twisted-pair wiring. The module, with 12 RJ-45 ports, will be available in December and will cost $9,950.
Synernetics: (508) 670-9009.

Accton Technology Corp. last week announced a new family of Ethernet network interface cards (NIC) that feature the company's new Multi-Packet Acceleration software/hardware design. On the hardware side, Accton improved packet handling by incorporating the network controller, bus interface and transceiver capabilities on a single chip. Software improvements include enhanced network drivers and a node management utility.
The new line includes three 16-bit Industry Standard Architecture NICs: the Ether-Combo-16 (supports both coaxial cable and twisted-pair connections), the EtherPair-16 (twisted pair only) and the EtherCoax-16 (coaxial cable only). The cards will be available next month, with pricing starting at $109. A special introductory price of $79.95 will be available at that time.
Accton: (510) 226-9800.

Apple's VITAL offers network design rules

Apple Computer, Inc.'s Virtually Integrated Technical Architecture Lifecycle [VITAL] was designed to provide network designers with a blueprint for optimizing enterprisewide information systems. Although based on desktop computers as the integration point, the architecture was intended to be both vendor- and platform-independent.

VITAL is said to leverage existing investments in mainframe and minicomputer systems by connecting them with desktop computers, providing a consistent interface to all of an organization's legacy systems.

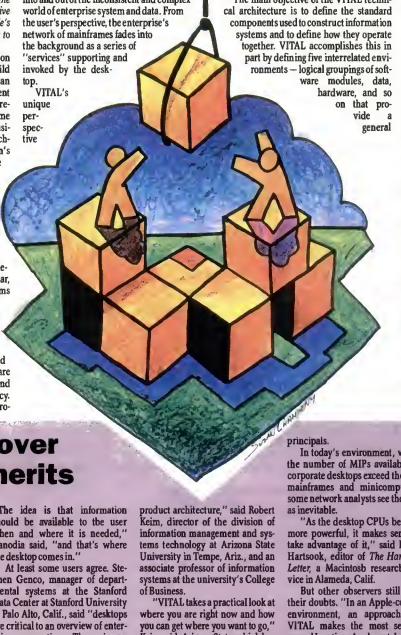
Apple lays out the VITAL blueprint in "The Vital Architecture Guides," a series of six books totaling thousands of pages. The following was excerpted from "VITAL Fundamentals," the first book in the package, and is intended to give network designers a glimpse of Apple's conception of how enterprise networks ought to work.

In an ideal world of enterprise information systems, organizations would be able to build systems from the ground up. A master plan would be used to orchestrate the development of new systems and would provide comprehensive guidelines for development each time the organization changes structure, the business needs change, and each time a new technology is delivered. All of the organization's hardware components would run the same operating system and would communicate using the same techniques.

The power of personal computers — whether portable or on the desktop — would be used to the fullest to enhance worker productivity and to share the processing burden effectively with mainframes and minicomputers. In addition, newly developed systems would be integrated by design and would use a modular, plug-and-play approach to allow new systems across the enterprise to reuse and share existing software modules.

Today's information systems landscape looks quite different from this idealized picture, however. Because enterprise systems have been developed piecemeal over the last few decades, they are typically on incompatible platforms and exhibit a great deal of functional redundancy. This makes it very difficult for today's IS professionals to keep up with the shifting requirements of the business, emerging technologies, and the increased demand for computing power for the individual worker within the enterprise.

The VITAL architecture views enterprise systems from the perspective of the individual knowledge worker. An individual's personal computer is a personal agent into and out of the inconsistent and complex world of enterprise system and data. From the user's perspective, the enterprise's network of mainframes fades into the background as a series of "services" supporting and invoked by the desktop.



VITAL's unique perspective causes systems to be built in a fundamentally different way than they have in the past. At the same time, VITAL preserves investment in legacy systems by gracefully masking their inconsistencies from the user. Because this perspective supports the individual as the local point of design, systems are more adaptable and more operationally efficient than their traditional predecessors.

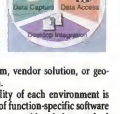
The main objective of the VITAL technical architecture is to define the standard components used to construct information systems and to define how they operate together. VITAL accomplishes this in part by defining five interrelated environments — logical groupings of software modules, data, hardware, and so on that provide a general systems function.

The five VITAL environments are:
1) Desktop Integration
2) Data Capture
3) Data Access
4) Repository
5) Systems Infrastructure

The Systems Infrastructure environment acts as the underlying framework that supports the other four environments.

Each VITAL environment is founded on a set of principles that outline its objectives and describe the characteristics of that environment in an ideal world.

IS professionals will find that the principles themselves can be used as a launching point for discussion at all levels of the organization.



It is important to remember that each environment represents a logical category of information systems processing and is independent of any particular platform, vendor solution, or geographical location.

The functionality of each environment is provided by a set of function-specific software services: These are considered the standard components of systems. Descriptions of these services and how they interact within and among environments comprise the majority of the VITAL architecture.

Each VITAL environment consists of software services — the primary building block of modular VITAL systems and resources — primarily consisting of data resources, messages, and metadata resources that contain definitions and navigational data about the services and data. A service is a piece of software or a set of software routines that respond to incoming requests from any VITAL environment.

For example, a Desktop Integration service may receive requests from a service in Desktop Integration itself, or from the Data Access, Data Capture, Repository, or Systems Infrastructure environments. Each service is func-

See VITAL, *page L12*

Debate over VITAL's merits

BY FREDRIC PAUL

Cupertino, Calif.

Apple Computer, Inc. originally designed its Virtually Integrated Technical Architecture Lifecycle [VITAL] not as a marketing tool for its Macintosh computers, but as a response to its own experience with incompatible and mainframe-based legacy systems.

But while the VITAL designers took pains to be vendor- and platform-independent, many observers feel it is biased toward Apple's desktop-centric view of the world.

"Apple has a user-centric view of things," acknowledged Raj Kanodia, the acting manager of Apple's VITAL architecture group, and VITAL is consistent with that.

"The idea is that information should be available to the user when and where it is needed," Kanodia said, "and that's where the desktop comes in."

At least some users agree. Stephen Genco, manager of departmental systems at the Stanford Data Center at Stanford University in Palo Alto, Calif., said "desktops are critical to an overview of enterprise computing. There is an incredible number of [million instructions per second] and functionality there." Integrating desktop power into the enterprise is a key element of any modern information systems (IS) strategy, Genco said.

"VITAL is really above the product architecture," said Robert Keim, director of the division of information management and systems technology at Arizona State University in Tempe, Ariz., and an associate professor of information systems at the university's College of Business.

"VITAL takes a practical look at where you are right now and how you can get where you want to go," Keim said. Arizona State, which has some 4,000 personal computers and 2,000 Macintoshes connected primarily with BanyanSystems, Inc.'s VINES local network technology and a Transmission Control Protocol/Internet Protocol backbone, has built a prototype data warehouse based in part on VITAL principals.

In today's environment, where the number of MIPs available on corporate desktops exceed those in mainframes and minicomputers, some network analysts see the shift as inevitable.

"As the desktop CPUs become more powerful, it makes sense to take advantage of it," said Pieter Hartsook, editor of *The Hartsook Letter*, a Macintosh research service in Alameda, Calif.

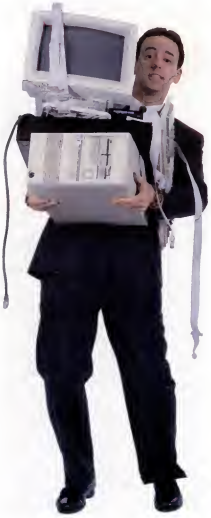
But other observers still have their doubts. "In an Apple-centric environment, an approach like VITAL makes the most sense," agreed longtime Apple watcher Bill Higgs, now at Multidata Corp. But in other environments, Higgs said, it becomes just another contender to be judged on the merits of the particular situation.

Chris LeTocq, a service director for InfoCorp in Santa Clara, Calif., was even more cautious. "The key for IS managers is that they want to tie things together with something they control," LeTocq said, "and that's generally not the desktop."

Stanford's Genco, who manages a network comprising a proprietary mainframe and a 50/50 split of PCs and Macintoshes, defended VITAL's perspective. "I think VITAL is pretty good at putting the desktop into the overall enterprise environment," Genco said. "So it's not just a desktop architecture and it's not just an Apple architecture."

Stanford has built a University Data Warehouse using a number of ideas from VITAL's Information Access environment, Genco said. "We also use VITAL as a reality check for things we come up with on our own," he added. "The notion of generalizable, modular software components that can fit together in scalable ways is important to us." ☐

T1 SNMP made simple.



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FDDI delivers multimedia today

No need to wait for other net technologies.

BY STEVE COOPER

It is getting harder to deny the notion fostered by many observers that multimedia has hit its stride as a commercially viable technology.

But the appeal of multimedia is still mostly restricted to a single user's desktop. Applications that let users share voice, video and imagery over local-area networks — allowing users to collaborate on tasks ranging from spreadsheets to video presentations — have yet to materialize.

The cost of providing numerous users with individual CDROM disks is prohibitive for many companies, and sharing CDROMs is inefficient. Corporate applications such as multimedia databases and multimedia conferencing require multimedia-friendly LANs to be effective.

VENDOR VIEW

The chief barrier to multimedia's emergence on LANs lies in the inability of the networks to support high-quality sound and full-motion video. Networks need to be able to guarantee bandwidth, timely access to applications and high-transfer rates to accommodate burgeoning files. Five seconds of full-motion video requires about a megabyte of storage space.

According to David Lewis, staff scientist at Eastman Kodak Co. of Rochester, N.Y., the bandwidth requirements for the next generation of digital-video-based multimedia systems are as much as 10 times as great as for current text and data files.

"Full-motion video, even in digital form, requires a minimum of 360 pixels by 288 lines at 24 bits per pixel, or at least 300,000 bits per frame," he explained. "This is 100 times the memory requirements of a full page of text. Full VGA-resolution video requires 1.2M bytes per frame and high-definition television-like resolution, at 1,930 by 1,035 pixels, requires three megabytes per frame."

Despite the multimedia limitations of traditional LANs, some innovative mechanisms are now being proposed, notable among them is synchronous Fiber Distributed Data Interface (FDDI-Sync), a low-cost extension of the existing FDDI standard, and FDDI II, a standard for isochronous LANs.

WIDE-BANDWIDTH FDDI

Over the past three years, FDDI has become the backbone network of choice for much of the Fortune 500 companies due to its high bandwidth, efficiency and reliability.

Designed as a fiber-optic environment, FDDI features two counter-rotating rings, each of which delivers raw transfer rates of 100M bit/sec — 10 times that of Ethernet — with lower bit error rates than earlier networks.

Despite its technological advances, FDDI networks have traditionally been relegated to connecting lower performance networks in large business environments, primarily because of their high price tag.

Today, however, FDDI is being pushed out to the desktop to support multimedia applications that integrate video, compact disc-quality audio, voice, imagery, graphics and text.

These applications provide new challenges to network designers. They require much greater bandwidth and much tighter control of network timing to guarantee that a node has access to the network pipe when the application has something to send. Synchronous FDDI provides these guarantees.

SYNCHRONOUS FDDI

Synchronous FDDI is a service that runs on top of the standard asynchronous FDDI service and guarantees bandwidth to nodes participating in multimedia applications.

In addition, it supports all of the standard asynchronous packet delivery mechanisms that make FDDI an efficient packet mover. In this way, the time- and bandwidth-sensitive multimedia traffic is supported with minimum impact to standard file transfer services.

Synchronous services on FDDI were anticipated by FDDI's early designers, and support for these services were built into the FDDI media access control (MAC) and Station Management (SMT) standards.

Provisions for FDDI-Sync services have been implemented in virtually all of the chips that are used by today's FDDI board and system manufacturers but have remained unused primarily because there were few applications that required them.

At the ANSI X3T9.5 (FDDI) meeting in December 1992, the FDDI Synchronous Implementers Group (FSIG) formed to expedite delivery of standardized distributed multimedia solutions to users. Because demand for open systems and distributed multimedia now exists and Asynchronous Transfer Mode (ATM) is still a few years away, FSIG recognized the need to expand FDDI's capabilities for users who now need multimedia-capable LANs.

Today, there are more than 50 FSIG members, including ALFA, Advanced Micro Devices, Inc., IBM, 3Com Corp. and National Semiconductor, who are working on an addendum to the SMT and MAC specifications of the FDDI standard.

The addendum will define a uniform procedure for allocating synchronous bandwidth to network stations to avoid potential problems such as overallocating synchronous bandwidth in networks that contain asynchronous and synchronous stations.

FSIG members are also addressing internetworking issues that are not specific to FDDI standards, including how other LANs may use the new synchronous services and how FDDI-Sync can be integrated into wide-area connectivity solutions and emerging network developments such as 100Base-VG.

Much of the work being done by FSIG also benefits the other FDDI standard — isochronous FDDI II. Designed as a superset of FDDI, FDDI II has a second or hybrid mode of operation which adds isochronous services.

Instead of being based on token passing, FDDI II is based on a circuit-switching architecture that employs a multiplexing technique to slice FDDI's 100M bit/sec bandwidth into 16 separate 6.144M bit/sec circuits or isochronous channels, each of which can be further subdivided into 96 individual 64K bit/sec ISDN B channels. Each circuit is able to support asynchronous or isochronous traffic.

FDDI II carries traffic in channels, instead of packets like FDDI-Sync; therefore, it can guarantee not only bandwidth, but also a fixed delivery time for multimedia traffic. In addition, FDDI II reduces node-to-node network delay to approximately 125 microseconds, or one-sixty-fourth of the delay for synchronous FDDI.

Because FDDI II is isochronous and is based on the same clock, time slots and wide-band channels of existing time-division multiplex-based T-1 and T-3 services, it also provides a seamless and low-cost interface to these ubiquitous and cost-effective wide-area links.

In addition, FDDI II will provide a logical migration strategy to ATM when ATM standards and pricing become a reality. The virtual circuit characteristics of FDDI II are compatible with ATM cells, allowing ATM cells to be seamlessly mapped into FDDI II frames and eliminating the need for additional complexity to integrate the two environments.

Because FDDI II is not backward-compatible with FDDI, like FDDI-Sync, FDDI II has received a lukewarm reception from the networking industry. However, because both LAN types are standardized and viable technologies today, it is conceivable that FDDI and FDDI II will be implemented in parallel as Ethernet and token ring are today.

Some of the industry's leading networking vendors, such as National Semiconductor and IBM, have announced plans to introduce FDDI II products. ALFA, Inc., the first company to develop and market FDDI-Sync products, also plans to introduce FDDI II products for distributing multimedia, once FDDI II chips become available.

TOO LITTLE, TOO LATE?

Although the combination of these emerging FDDI technologies and vendors' recent cost reduction efforts make FDDI a good choice for multimedia computing, FDDI no longer has a monopoly on the 100M bit/sec network backbone.

Several other LANs with markedly similar characteristics are now being proposed by the IEEE 802.3 subcommittee of the IEEE Project 802, a rival standards body to ANSI X3T9.5, which developed FDDI.

The other project being proposed to the 802 executive committee is 100M bit/sec Ethernet. Like its 10M bit/sec predecessor, the high-speed Ethernet has no priority mechanisms and has not been designed to support multimedia. However, future extensions and implementations such as a 100M bit/sec "switched" services might allow it to handle most multimedia requirements.

➡ Cooper is vice president of ALFA, Inc., a developer and manufacturer of high-performance, multimedia-friendly LAN products located at 110 Breeds Hill Road, Hyannis, Mass. He can be reached at (508) 790-6901.

LAN PRINTING

Intel debuts high-end print server

BY FREDRIC PAUL

Hillsboro, Ore.

Intel Corp. last week introduced the NetportExpress XL, a new high-end addition to the company's line of print servers.

Compared to Intel's existing Netport II, the NetportExpress XL delivers a major jump in performance and adds hardware support for multiple network protocols. The new server also supports up to three printers at a time, with a pair of high-speed bidirectional parallel ports and one serial port.

About the size of a videotape, the NetportExpress XL consists of an Intel 80186 processor, network interface chips, 1M byte of random-access memory, 128K bytes of flash memory and a ClientOS multitasking operating system that lets it switch between network protocols.

The NetportExpress XL will be able to run as many as three protocols simultaneously.

According to Chad Taggard, Intel's product-line manager for network printing, the NetportExpress XL currently can be used in Novell, Inc., NetWare networks, and software to support AppleTalk and Transmission Control Protocol/Internet Protocol networks will be available in September. Software support for LAN Manager for OS/2 and Windows NT is due out by the end of the year. "We'll be supporting [the protocols] in native mode," Taggard said, not encapsulated in Internetwork Packet Exchange (IPX) nets. That should make for better performance.

The NetportExpress XL will be able to run as many as three protocols simultaneously, so users on all kinds of networks can share the same printers.

Over time, the bidirectional ports will allow printers to provide immediate feedback to users about problems with print jobs. The hardware is in place now, Taggard said, and the software will be available by the end of the year. The parallel port complies with the IEEE 1284 bidirectional specification and will support both the Network Printing Alliance and HP-PJL bidirectional printer management protocols.

Flash memory, a sophisticated version of erasable programmable read-only memory, and Remote Boot Load software lets network administrators install the NetportExpress XL software on the file server and allows the servers to automatically retrieve, download and install it locally.

New, centralized print management software will help administrators work with the print servers.

The NetportExpress XL supports any make and model of printer, works with as many as eight file servers and 32 print queues, and supports NetWare-encrypted passwords.

Ethernet versions of the NetportExpress XL will ship later this month for $599. A token-ring version will be announced in about a month, Taggard said, but no price has yet been set.

Until the end of the year, Intel will offer a $299 trade-in program for users of the Netport II and competitive print servers, such as Hewlett-Packard Co.'s JetDirect EX, Castelle Corp.'s LANpress 1+1, MiLAN Technology Corp.'s FastPort and Emulex Corp.'s NETQue.

With the introduction of the NetportExpress XL, Intel is also cutting the price of the NetPort II from $699 to $499 for Ethernet versions and from $999 to $699 for token-ring setups. ◻

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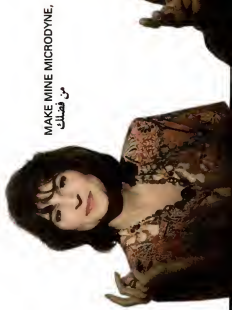


Circle Reader Service #8

Banyan

Continued from page L1

year and started to ship in the first quarter, becomes strategically important in those accounts where the decision is top-down.

Now we can go to an executive that has a lot of pockets of NetWare but is thinking NT may be the logical choice in a year or two and say, "Maybe what you need to do is convert this into a two-level decision. What are you going to use on the desktop or in the work group? And how are you going to run the organization; how are you going to manage it all?"

We're positioning ourselves to have a "don't care" attitude about the work group decision. What makes that possible is ENS for NetWare and ENS on other departmental platforms.

What we're doing is laying out a blueprint of what a truly long-term strategic implementation of an enterprise network looks like. The model for that is what has been the Distributed Computing Environment promoted by the Open Software Foundation [Inc.].

When selling your products, is the objective to make your vision of the enterprise fit into existing visions or do you have to play the role of an enterprise network evangelist?

It's a combination of both. A lot of it has to do with this logical path from a centralized environment to a totally decentralized environment — networks that are physically decentralized and logically centralized.

When we were starting this company in the '80s, we decided to invest in building an enterprise networking solution for large businesses recognizing the need for the equivalent of mainframe-like services. We called them networking services.

They include directory, administration, management, security and messaging. These are the core services that you need if this services model is to satisfy the enterprise customer. We have been delivering those capabilities for 10 years in the form of VINES.

Novell, Apple, Microsoft and some of the Unix platforms have been delivering the more localized solutions [in the work group environment]. For these work groups to become part of a true enterprise, they either have to expand to add these capabilities or somebody has to provide them in such a way that they can be plugged in.

To help customers avoid having multiple types of services, we have been investing in our ENS-for-different-[network operating systems] strategy; the first one being ENS for NetWare. Our customers can use a VINES network to extend the same services to various types of work group environments, like the NetWare 2.X, 3.X and 4.X worlds, and Microsoft Lan Manager and TCP/IP.

So you can see this picture of a consistent model developing. Now, as an MIS executive, I can draw a line and make a decision on two levels. I know down at the work group level I can't make a decision that I can stick with forever because Novell and Microsoft are going to continue to slug it out. I can't count on either one of them to grow into this space where they can allow me to make an independent decision relative to the other one.

There are three things that have to be looked at above the line: connectivity, database and services.

The services now have to be provided as a group enterprise solution, as opposed to an individual desktop environment. Our strategy is to continue to focus on building the strength that needs to be in these services, which means building the services themselves and evolving them to support standards as much as possible.

In terms of network management, SNMP is the standard on which we are building. We're building a strong position in terms of managing this environment and being managed by this environment.

Parallel to that, we continue to build more and more strength into our directory. It is still the most robust, easiest to use directory in the industry, and it will be for a long time, maybe forever. But we realize that there is a migration path that the customer has to go through if they are going to get to a DCE-based enterprise environment.

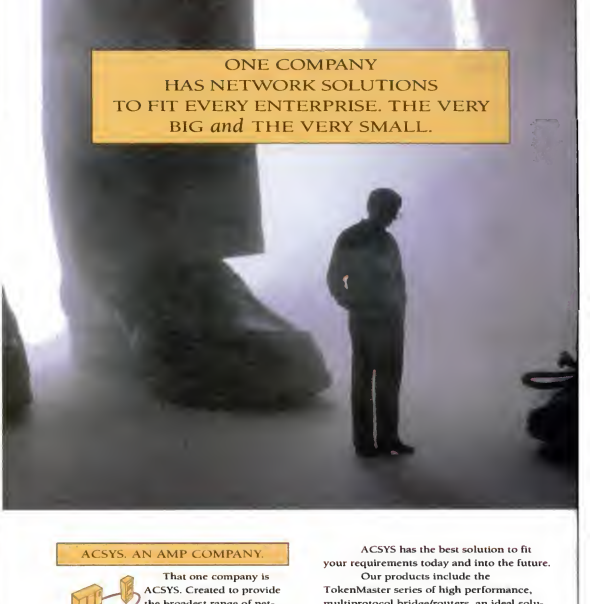
The last [area] we are committed to and making sure our customers understand is that we are going to be a strong ally in their long-term movement to DCE. As X.400 and X.500 become accepted, we will provide integration and interoperability to those environments. It's the role that we play.

Other areas we intend to address as part of these services include backup recovery and disaster recovery, software distribution and wide-area applications.

How does Banyan's concept of network services differ from that of Novell and Microsoft?

Novell draws a similar picture of directory services and messaging in all their presentations. They put it down here [physically] in NetWare. You cannot get Novell directory services without putting NetWare everywhere.

Microsoft draws the directory services in NT. The Mac has a directory service in it. These Unix guys also have a directory service in Unix. We are the only vendor who has really subscribed to DCE's model, which says that it doesn't belong in the operating system space; it belongs in application space. That is a major



differentiation that cannot be overcome easily. That is a fundamental flaw.

What is the benefit to the customer?

We came out with ENS for NetWare and we can immediately integrate 2.X, 3.X and 4.X environments with our directory. Novell came out with 4.0 and they can't use it to integrate their existing environments. They have to replace these with 4.0 to get full directory utilization. They can do some low-level stuff in integrating the binderies, but it is not a global name.

Take Novell's position. The two services that need to be in total lockstep with one another in order to build a cost-effective network are directory and messaging. Directory is a list of the elements that exist in the network. Messaging communicates things between those elements. If the messaging environment doesn't use the same directory to find the elements, that seems kind of foolish, doesn't it? That's exactly what exists in a NetWare environment in 4.0. The messaging environment does not use the directory. You have a different messaging environment for the messaging system than you have for the basic directory.

Over time, Novell could piecemeal everything together, but if you only put out one major revision of your technology every year and a half, then it's going to take a long time for most people to get this.

Longer term, what do you see as the competitive threat of NetWare 4.0 and the new NetWare Directory Services?

I'm not sure I see it as competitive rather than complimentary.

We have a strong market position today as the provider of enterprise solutions. Novell has a strong market position as the provider of work group solutions. We both have growth objectives targeted to large organizations, and there are a lot of large organizations. I think of 4.0 as a NOS with a file- and print-sharing capability, and some of the competitive capabilities that would make its technology competitive with Microsoft. I think that we can actually help Novell.

You don't need to buy 4.0 for the directory services. You should be looking to buy it for a lot of other things. I think very few customers in the next year will buy it for the directory services.

With developers aligning themselves behind certain sets of application program interfaces (API), how do you encourage third parties to build to the VINES/ENS environment?

The API war down on desktop is really confused today. You've got Windows, you've got the basic operating environment, you've got a lot of decisions to make. You really only care about a couple of APIs in our arena. One is messaging, but we're providing most of the solutions for the messaging environment. We're building a messaging backbone and we're accommodating the matching of things from other environments. We're effectively solving that problem for the customer.

But the other issue is from an application point of view. If you want to write a client/server application and your client wants to be able to find something in the network, then the resource has to be registered someplace in a global directory. We define the global directory. We define one very simple and comprehensive API, which is called StreetTalk Directory Services API.

Any application or client can easily access STDA and find out where anything is in the network. Right now, that's anything that is registered from a VINES perspective.

As customers put ENS in place on other platforms, they become part of STDA shared knowledge. So now an application written in a 2.X environment can find out through STDA where a user is in another Novell environment.

So this API is a very important one. This is an API that each one of these other LAN guys can try to define, but unless it's done globally, it has no global meaning.

In the server portion of the client/server realm, who is the application developer writing to?

I assure you that very few customers over the long term are going to buy a mission-critical strategic database on a proprietary operating system down at the work group level. Oracle on NetWare [OracleWare] is an interesting idea, but enterprise customers are not going to run, for the purposes of a large scale network, a lot of work on it.

Our strategy would be to put Oracle [database products] on whatever platform you choose, say Solaris, [along side of VINES/ENS] and then it becomes an accessible service registered within the global directory that can be accessed from any client, independent of the underlying NOS that it happens to be connected to.

So if I am running a client/server application and I have an SQL client running in a Windows environment, the only thing that I want to get to is the database. The benefit of this strategy is Oracle [Corp.], Sybase [Inc.] and everybody else as only required to do one thing: to be able to register with STDA. Everything else is a standard product on a standard platform.

So in your model, application vendors build to the core platform operating system and to a few of

See **Banyan,** *page L11*

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Circle Reader Service #6

Backbone

Continued from page L1

are wired back to a centralized shared-media backbone — usually based on Fiber Distributed Data Interface — which supports the bridges, routers and servers on the net.

In the inverted model, the backplane of a high-speed internet device becomes the backbone, receiving feeds from the subnets as well as supporting the net's server clusters. This device is typically a bigh-end router that offers bandwidth capacity between 500M and IG bit/sec, significantly bigher than the 100M bit/sec gleaned from the FDDI approach.

The benefits of both strategies are compelling. Because critical net devices are centralized, it makes the job of supporting, growing, monitoring and fixing the network easier.

"Users are looking to reduce the number of small, independent routers or bridges that are placed throughout their organization because they are difficult to troubleshoot and manage," said Fred McClimans, program director at Gartner Group, Inc., a consultancy in Stamford, Conn. "A high-end router in the data center can help them achieve that."

Centralization also allows support technicians to be more productive, according to Emily Green, associate vice president of strategic marketing at Fibermux Corp. "Collapsed backbones allow you to keep common troubleshooting equipment in one place and have access to all points of the network," she said.

They also ease management and maintenance of servers by making it possible to build big server farms in the data center. "Backups can be done more easily," Green said.

Collapsed and inverted backbones are more secure than traditional backbones because only one room requires security and controlled physical access to critical devices.

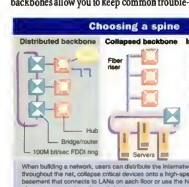
"Wiring closets are usually not secure places," Green said. "Having that equipment distributed remotely makes the net vulnerable. If you centralize that, you can plan security easier."

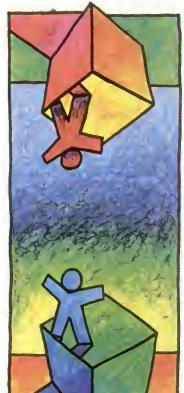
The primary advantage of the inverted over the collapsed approach is performance. "If you look at routers or switches being used in this architecture, they generally offer an excess of 500M bit/sec of total switching/routing capacity, which allows you to virtually have a non-blocking connection between any two low-speed LAN ports on the device," McClimans said. "That is something you don't get through a sbared FDDI architecture."

Because there is a single router at the core of the network, the inverted architecture also offers a cost advantage. Buying one large, high-performance router is less expensive than purchasing several smaller routers for each floor.

The architecture also allows users to improve the throughput of links between LANs and achieve greater bandwidth than distributed or collapsed backbones, where users are constrained by a fixed amount of bandwidth, be contended. Collapsed backbones, bowever, get around the single greatest liability of inverted nets — creation of a single point of failure.

"There are a number of people concerned about putting a single router at the core of their net because most of the routing technology today has not been blessed with extreme fault tolerance," McClimans said.





That sbortcoming, bowever, is being addressed by router makers. "We see vendors like Wellfleet [Communications, Inc.] going out of their way to build fault-tolerant platforms, but, in general, routing is still a technology that crasbes and goes down," be said.

Some users are overcoming that liability by implementing dual collapsed backbone nodes and load balancing between the two devices via a high-speed connection, whicb is most often an FDDI link.

Another drawback of router-based inverted backbones is related to the router itself. The inverted architecture that is currently implemented with the router may not be the device desired two or three years from now, according to McClimans.

"In terms of the growth of the inverted backbone, the router vendors supplying that backbone node will be challenged by two otber emerging devices: the next-generation switching bubs and [Asynchronous Transfer Mode] switcbes," he said.

By introducing switching into the core of their bub architectures, bub makers bope to make inroads into the inverted backbone market. The bigh-speed switching and increased capacity and throughput that integrated switching technology would bring to the bub make it a credible player.

The ATM switch vendors, with their gigabit-speed boxes and ability to integrate several different media, are also vying for space in the inverted market.

The router vendors, bowever, are still the force to be reckoned with in the inverted backbone environment. A number of the leading players bave introduced bigh-end boxes that are specifically designed to play in that environment.

"While some users will take the bub-centric approach when only a few LANs are involved and leading-edge users will bead straight for ATM, routers will remain strong because they are relatively low cost and familiar," Hyland said.

McClimans pointed out that if the alternatives come to the forefront, the question of where the routing is placed will have to be answered because routing will still be needed.

"Because these ATM and switching technologies are still new, there are a number of unknowns and danger points to consider," be said. "As you start to deploy switches in the middle of a routed network, what happens to the routing protocols? What happens to logical firewalls? How are addresses translated between router-based IP nets and ATM-based media access control networks?"

Since no two vendors are completely consistent in their plans or strategies to address these concerns, he said, the user will be faced with a difficult dilemma. ◪

AppWare

Continued from page L1

tion development system based on the latest concepts in object-oriented programming in a distributed environment. It conforms to standards (emerging ones, but that's better than none) and supports development of multiple platforms in a network environment.

Why objects? At the risk of retreading ground that bas been hammered flat, object-oriented programming systems [OOPS] offer a different and potentially more efficient way of building applications.

In an OOPS system, program code and any data it controls are conceptually bound together — the entire code and data is an object. For example, an object could consist of a database engine and the data it manages. The database object would not only perform data storage and retrieval functions — called methods in OOPS terminology — but would encapsulate the database itself.

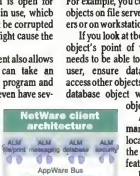
To instruct an object to perform a function, you send it a message — for example, "Store this record." The beauty of the concept of OOPS is tbat objects are self-contained; they respond only to messages, and none of their code or data is open for access when they are in use, which ensures that they can't be corrupted or used in ways that might cause the system to fail.

This self-containment also allows for reusability. You can take an object created for one program and reuse it in another or even have several programs share the object simultaneously.

When objects are extended to the network environment, services such as databases, directories, messaging and so on can be implemented as objects. Tben, when you want to do something with an object, all you need to know is what messages it understands and what methods it has.

Actually, that's not all you need to know. You also need to be able to find objects on a network because they might exist anywhere in the system. For example, you could have printer objects on file servers, on print servers or on workstations.

If you look at the system from the object's point of view, the object needs to be able to authenticate the user, ensure data integrity and access other objects — for example, a database object would use a file object to store data.



As you'll see, managing object locations is one of the most important features of AppWare.

Big Red bas two main reasons for wanting to stimulate and ultimately own the network application market: It will weaken Microsoft Corp.'s begemony on application development in general as well as threaten Novell's control of the network market in particular.

There's also the issue of wbo owns the desktop and wbo defines the standards and technologies that the end user interacts with. At present, Microsoft is the dominant force, but Novell didn't buy Digital Researcb, Inc. and its DR DOS operating system technology because the company had a cute logo. Novell knows that losing control of the desktop would be a strategic disaster.

AppWare is an architecture that addresses all these issues. It gives developers access to sophisticated object-oriented tools, enables network application development and puts Novell in a strong position with regard to wbat's happening out on the workstations.

DOMS AND ORB

The foremost vendor in the area of distributed object technology is HyperDesk Corp. of Westborough, Mass.

Its product, HyperDesk Distributed Object Management System (HD DOMS), is not only arguably the most advanced product in the market, but is also tbe first to offer full compliance with the Object Management Group's (OMG) Object Request Broker (ORB) specification.

The OMG is a coalition of vendors developing guidelines for object-oriented software systems. The key standard the group has developed — apparently strongly lead by HyperDesk — is the Common ORB Architecture, a set of portability and interoperability standards for object-based systems.

In January, Novell announced that it was taking a 20% stake in HyperDesk. This makes a lot of marketing sense since HD DOMS provides all the distributed services Novell needs to do anything with objects in a network environment.

Under AppWare, the HD DOMS ORB is a NetWare Loadable Module

See AppWare, page L9

AppWare

Continued from page L8

that can run on a NetWare 3.X or 4.X server, or a NetWare RunTime server. NetWare for DOMs — Novell's name for its implementation of HD DOMS — provides the object management services, routing of messages between objects and authentication services.

The HD DOMS ORB has been implemented on Unix systems from Data General Corp., Hewlett-Packard Co. and Sun Microsystems, Inc. In a heterogeneous network, HD DOMS ORB implementations, or ORB engines, can talk to one another to find objects, and any HD DOMS client can talk to any ORB server. Now, any object in any client application or ORB server can find and use any object on any platform on the network that supports an ORB engine.

THE MISSING PIECES

The next piece of the AppWare system that is required is a collection of useful objects. To supply these, Novell entered into an agreement in April to acquire Software Transformations, Inc. (STI) of Cupertino, Calif.

STI offers a tool kit called the Universal Component System (UCS), software with a common application program interface (API). This API allows applications to be ported from one platform to another, and the way the program interacts with the operating system never changes.

If the application uses a menu interface, a software component is called. The way the applications communicate with the component through an API is the same and does the same job whether the Windows or Macintosh operating system, for example, is being used.

The UCS components come in three main groups, or series, as STI calls them. The Foundation Series covers basic systems operations, such as memory management and event handling. Windowing support, menus and other interfaces are provided through the Interface Series, and, most importantly, modules that link applications across networks form the Connectivity Series.

What is really important about STI's UCS is that it is designed to provide modules that can build applications on a wide variety of platforms. Windows, Macintosh and Unix are currently supported, and OS/2 support is planned.

The UCS modules are procedural code units suitable for linking with C, C++, Pascal and assemblers. For C++ programmers, there's a complete portable object architecture to interface with UCS.

The final part of the AppWare system is the tools to build applications with reusable components — an object-based application construction kit. In May, Novell continued its acquisition rampage and signed an agreement to acquire Serius Corp. of Salt Lake City.

Serius' product is a sophisticated visual program development system that creates applications that are portable between different operating systems. At present, that covers only Windows and Macintosh, but, again, a wide range of targets are lined up. Under AppWare, this component is called Visual AppBuilder.

Novell's AppWare takes the technologies of these three companies, wraps them into an architecture and provides the sales and marketing framework that none of them had individually.

The architecture (see graphic, page L8) consists of applications that run on network clients that communicate with distributed objects on the network. These applications, called AppWare Loadable Modules (ALM), plug into the AppWare Bus. This bus is effectively a run-time support system that supplies the interface to connect ALMs to NetWare for DOMS, the new name for HyperDesk's HD DOMS for the NetWare environment.

The NetWare for DOMS interface allows messages to be sent to objects anywhere on the network via the services of an ORB engine running on a server. Once an object has been created on the network and registered with NetWare for DOMS, it can be accessed or reused with the net being effectively transparent.

ALMs could be complete programs — for example, Excel could be implemented as an ALM — but probably over Bill Gates' dead body — or they can be modules that are not actually whole programs themselves but provide support-specific services for other programs. Novell plans to offer ALMs for telephony, imaging and multimedia, among other things, that can be integrated into applications.

Underneath the bus is the AppWare Foundation, based on the STI UCS, that resolves the problems of how the ALMs get the services they require from the client operating system, the local graphical user interface services and the network.

NetWare for DOMS will be bundled with NetWare to provide inherent support for AppWare applications. For developers, AppWare gets around the problem of the lack of market for the original HyperDesk HD DOMS product. What developer would build products for HD DOMS when no one has it? Novell's support changes all of that.

Current estimates are that this bundle will create 400,000 NetWare servers running HD

See Novell, *page L11*

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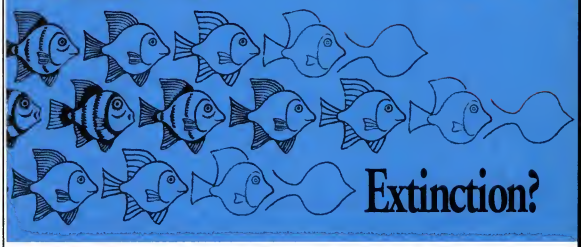

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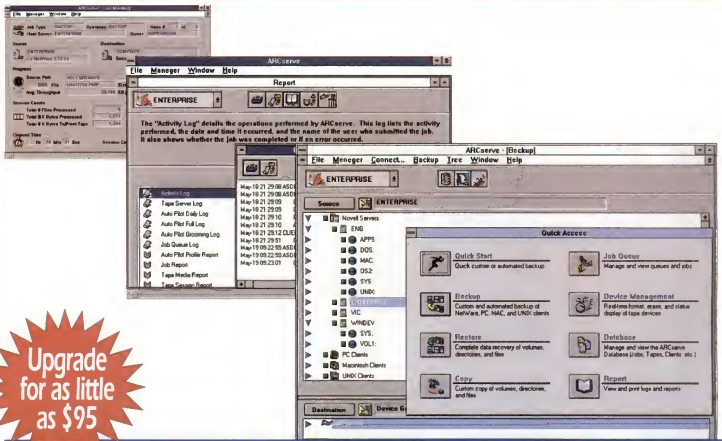

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Circle Reader Service #7

Banyan

Continued from page L7

your APIs, whereas OracleWare is built directly to NetWare. Are there richer services that they can provide by doing it that way?

For the work group user, I think it would probably give them higher performance at lower cost. For the enterprise customer, I doubt that would happen.

So there are no different services they can provide?

If you're running a client/server application, it doesn't make any difference. If you're writing a highly specialized application that is going to take advantage of some of the uniqueness of the NetWare environment with Oracle tightly integrated, maybe. If that's the case, that's not our targeted market.

Our customers are moving to client/server computing and they want tools to develop applications. They don't want to be in the business of understanding operating systems.

The rest of the industry keeps telling them not to do it yet because there's going to be a product coming along in a year or two that you're probably going to like. And they're saying that they can't afford to hold back because they'd have to buy more mainframes and they don't want to have to do that.

So I believe that, for their mission-critical applications, users in the next three to five years are going to pick a number of platforms as their enterprise application and database platforms, and then they are going to look to the client world to do just that, build clients.

Isn't that playing into Microsoft's hands? They would have you believe that NT is the route to follow because it is tightly coupled with Windows on your desktop.

Microsoft's future is predicated on trying to win 100% of the market share for the desktop. They can't be satisfied until they push Novell and Apple out of the way and own the definition of the desktop. And neither one of those other vendors can allow them to do that.

Their mission is to change the ground rules of the operating system on the desktop. One way to change it is to realize that an operating system shouldn't just be a client operating system. It should be able to give you information about other clients. Therefore, Microsoft says the next generation of the operating system really doesn't need a dedicated server or NOS.

Once again, you can do anything you want up to that line that separates the work group from the enterprise. Beyond that line, it's a very difficult world. It's heterogenous by definition and by desire. There are things that will be on the individual work group or department that are coming up from a lower department and can no longer be mandated by the vendor.

In the next three to five years, what do you see the market doing? What kind of growth do you foresee?

I think the decision process is lengthening some because the decision is becoming more strategic. But the relationship is longer term. In other words, we're talking to customers about our directions and their needs two to three years out as opposed to today. I think the issue of integration and cost of ownership is going to become a critical part of the decision.

I think that we are going to have a model here that says that relatively few vendors are going to play an important part in this and that customers are going to pick a set of vendors that they are going to work with for the next decade. It's going to be a couple of each, which means that it's going to continue to be a heterogenous world but a more manageable one. ◻

AppWare

Continued from page L9

DOMS and supporting more than four million users in the first year of shipment.

For users, AppWare comes at no cost, so they can use AppWare compatible applications.

Problems such as licensing control, integration and configuration should all become much simpler for AppWare applications.

The downside of AppWare will be that to get this level of flexibility and sophistication will require additional system resources and impact performance.]

Another issue is the kind of overhead AppWare applications will require when they interoperate with distributed objects through NetWare for DOMS.

The final issue is: Can Novell pull all of these components together and deliver what will be a ground-breaking developers' tool kit and application framework? It's likely that it will take several releases of AppWare and its components before it starts to become stable.

As Novell stands to lose a lot if AppWare fails, you can bet that there will be no lack of effort.

➔Gibbs is a writer and consultant based in Ventura, Calif. He also consults with the National Computer Security Association at (800) 488-4595. He can be reached at (805) 647-2307, through CompuServe (75600,1002), Novell's nHub (mgibbs@gyre) or on the Internet (mgibbs@rain.org).

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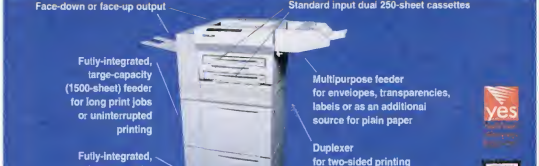

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Circle Reader Service #9

VITAL

Continued from page L2

tion specific — it is confined to perform a certain type of activity that can be used and reused by the system. Services are also message-based — they communicate with each other by means of parametrized messages. By isolating reusable code into modules in this way, organizations can begin to build platform independent, distributable, and adaptable systems.

The Desktop Integration environment acts as the user's agent to support the individual's personal productivity, workgroup collaboration and intercommunication, information consumption of institutional data, and data production. It presents a single system image of the enterprise so that users can concentrate on understanding information without being concerned about where or how it is stored.

Desktop Integration services automatically perform a variety of commonly needed tasks that otherwise would have to be designed and coded into every program. It provides the human interface, personal application support, interapplication navigation and cooperation, and interconnection requirements of the user. It enables users to enter data into transaction systems and request reports and analyses from decision-support databases.

The Data Capture environment is composed of transaction systems that collect, process, and validate data. Each transaction system is afforded maximum autonomy so that it can efficiently support vertical business requirements. This environment also manages the release of cross-functionally shared data to the Data Access environment.

The Data Access environment operates as an enterprise-wide utility that focuses on allowing users and other systems to retrieve data and view information from diverse sources consistently across the network.

It operates a shared data warehouse network that manages, stores, and distributes a cross-functionally shared data for common reference, analysis, and decision support.

The Repository environment consists principally of the a master data dictionary, libraries, and directories acting together as an encyclopedia that defines and describes the enterprise's systems resources. It contains metadata — data describing the location, data structure, platform, and other parameters of system data — as well as descriptions of processes, business rules, and validation criteria that help to define and maintain consistency throughout the system.

The Systems Infrastructure environment consists of a variety of fundamental services and resources that enable all the other environments, including:

- underlying networks and their connectivity;
- platforms and their operating systems;
- fundamental backbone services like DBMSs, Repository software, client/server connectivity middleware, and security;
- infrastructure management services used to manage the availability and efficiency of the hardware, software, and networks supporting the VITAL environments;
- common "global" utilities such as electronic mail, electronic data interchange (EDI), file transfer, and time synchronization.

Excerpted with permission from Apple Computer, Inc.

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Circle Reader Service #10

SDK

Continued from page L1

server, the versions of these NLMs and much more.

"Until now we used a proprietary MIB . . . to manage the NetWare server," Jain said. "That's because when we were developing it there was still a heated debate over whether SNMP or [Common Management Information Protocol] would be the management standard of choice. But, since SNMP has won the popularity contest, we've designed an SNMP MIB for NetWare."

The other three SDK pieces are all APIs: the NetWare SNMP Services Interface, the Desktop SNMP Services Interface and a group of NMS-specific APIs.

The SNMP Services Interface is an API that will let developers write NLMs or other server-based applications that can be managed via SNMP.

The Desktop SNMP Services Interface will provide the same management functionality but for desktop-based applications.

The fourth piece, the NMS-specific APIs, will let developers write applications that are more tightly integrated with Novell's NMS.

This SDK release precedes by several months the release of Version 2.0 of Novell's NMS, expected this fall. But even NMS 2.0 will not be SNMP-based, but rather will still rely on Novell's proprietary MSAPI for management. Novell's Jain would not say when NMS would be migrated completely to SNMP.

"Ultimately, MSAPI will be gone; it will be superceded by this," Jain said, referring to the SNMP-based APIs and NetWare MIB.

The NMS SDK 2.0 tool kit is available now for $495 through the Novell Professional Developers' Program.

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BRIEFS

As expected, **MCI Communications Corp.** last week announced that James River Corp. has exercised its right under Fresh Look and switched its AT&T Tariff 12 network to a custom net provided by MCI (*NW*, July 12, page 1). The paper products firm signed a three-year deal under which MCI will supply all of its 800 service and build a Virtual Network (Vnet) linking 140 sites in Canada, Europe and Mexico, and the U.S. James River's field sales force will use cellular access to the Vnet. The company will also use MCI's VideoNet multipoint dial-up videoconferencing service, which is based on PictureTel Corp. video products.

AT&T last week announced that it has received a four-year, $9 million contract from Apogee Enterprises, Inc. to build a global software-defined voice/data network that will link 350 Apogee locations in the U.S., the U.K. and Singapore. The carrier will also provide domestic and international 800 services to Apogee, a glass and aluminum manufacturer.

US West Communications, Inc. last week announced a satellite-based regional paging service called WestLink that will be offered to users in seven states. The offering provides users one monthly bill and one pager for all of their local and regional needs.

WestLink currently covers 40 markets in Arizona, Colorado, Minnesota, New Mexico, Oregon, Utah and Washington. US West plans to extend the coverage to include Montana, Nebraska, Nevada, North Dakota, South Dakota and Wyoming.

Customers can choose from two WestLink pricing packages, which are offered as enhancements to the local US West paging service. Under the Flex Plan, customers pay only $1 per month for complete access to WestLink and 90 cents per page received. The Maximizer Plan costs $15 per month plus 40 cents for each page.

US West: (206) 562-5483.

Metromedia Communications Corp. last week extended a promotion for its Unity line of calling services under which users receive 180 days of free calling every two years if they sign up for the service by month end.

The services include 1+ dialing in the U.S., direct dial to 200 countries, and calling card and 800 calls. It carries a 25% monthly discount on usage of all the services.

Metromedia: (800) 275-0200.

Pennsylvania has decided it wants a statewide broadband network. Last week, the state legislature approved and the lieutenant governor signed into law a bill that uses regulatory reform to encourage private infrastructure investment.

The bill allows telephone companies to petition the state's public utility commission for deregulation of competitive services in See Briefs, page 22

Banker half-pleased with frame relay net

J.P. Morgan in no hurry to get into ATM realm.

BY BILL BURCH
New York

If frame relay was supposed to solve all networking problems, investment banking firm J.P. Morgan & Company, Inc. is still waiting for the payoff.

J.P. Morgan, the fifth largest U.S. bank, relies on a domestic frame relay network to handle some of its $230 billion in daily funds transfers.

And the bank's transition to the frame relay network has had its share of problems, according to Stephen Martin, vice president of network services with J.P. Morgan. While installing the network, Martin has had to negotiate with users about standardizing on Transmission Control Protocol/Internet Protocol, cope with limited support from application software vendors and tweak his routers to cope with protocol quirks.

The bank's transition to frame relay has had its problems, according to J.P. Morgan's Stephen Martin.

After clearing those hurdles, Martin has decided to hang tight and let someone else work out the bugs in such new technologies as Asynchronous Transfer Mode (ATM).

As head of network services, Martin oversees the bank's 15-node domestic frame relay network. A firm believer in relying on providers that offer end-to-end network services, he decided to go with CompuServe, Inc.'s Frame-Net services for the domestic frame relay net.

Martin set up links ranging in speed from 56K to 128K bit/sec, depending on the size of the office being served. Access to the CompuServe net is provided via T-1 lines.

He had hoped to standardize the network on TCP/IP, but users demanded support for AppleTalk, Network Basic I/O System and other protocols. Forced to support multiple protocols, Martin then had problems setting up his Cisco Systems, Inc. routers to support them.

For example, he ran into trouble trying to support a mix of AppleTalk and See Frame relay, page 22

Survey details early adopters' ATM concerns

BY BOB WALLACE
Cambridge, Mass.

Lack of interoperability between different vendors' Asynchronous Transfer Mode (ATM) offerings is the foremost concern about the technology, according to a survey of 20 ATM pioneers.

The survey was prepared by McQuillan Consulting, based here, for the ATM Forum, which will use the findings to better address user concerns about ATM and, hence, to speed wider use of the technology.

McQuillan Consulting interviewed ATM users, including Ascom Timeplex, Inc., Bear, Stearns & Company, Inc., Boeing Computer Services, Digital Equipment Corp., Dow Jones & Company, Inc. Motorola, Inc. and Texas Instruments, Inc. (see graphic, this page).

"We've had to set up a laboratory to test for interoperability between different vendors' ATM switches," said Jeff Marshall, managing director of communications at Bear, Stearns. "It's been a struggle."

Marshall would not say which vendors' switches his company is testing, although it's known that the company is using switches made See Survey, page 22

Profile of an ATM user

Based on a survey of 20 early adapters.

Average network size	1993	1994	1995
T-1s	706	770	827
PBXs	91	97	97
Unused "dark" fibers	22	25	28
T-3s	26	31	37

SOURCE: MCQUILLAN CONSULTING, CAMBRIDGE, MASS.
GRAPHIC BY SUSAN J. CHAMPENY

MANAGEMENT

by Eric Schmall

Going beyond ordering circuits

"I think we've just entered the 'and here a miracle happens' phase," a colleague of mine remarked as we discussed the next steps of a pending project. We had just finished ordering the inbound circuits needed for a newly created direct marketing unit.

Our users/customers were under the impression that once they had ordered the right circuits from us, every operational issue would somehow be solved. But we weren't having any luck in getting our users to explain how and to whom they wanted the calls directed.

From a strictly technical standpoint, the telecommunications group had discharged its overall responsibilities. We had ordered the proper facilities and set up our direct-inward dial trunks to receive the calls. What was missing was the users' definition of how to handle the calls.

SCHMALL

Whenever the telecommunications department becomes involved in project development, it has to assume a pivotal role in assuring that the users have thought out how their proposed operations are going to work.

A value-added telecommunications unit now provides a great deal more than passing along orders to the telephone company or carrier. Our true contribution comes from understanding how a user's unit wants its work flow to operate. We must politely but firmly insist on knowing how our users want the information to flow.

This approach can be risky, however. The user may believe that you're intruding too far into operational matters. Also, the user may become resentful if your group's questions uncover some embarrassing gaps in their original plan.

So you need to ask not only the right questions, but also to remain sensitive when offering up suggestions. For instance, it's helpful if you preface your questions with descriptions of how you think a certain carrier's technical offering might make the operation more efficient. You should similarly offer examples of how certain aspects of technology can be of special value in achieving the users' operational goals.

The partnership that you must forge with your user base can never be realized unless you move toward a deeper appreciation of work flow analysis and design. Equally important is the skill set required to ask the right questions without appearing to antagonize the people you're trying to help succeed.

➡ Schmall is the telecommunications director of an insurance holding company.

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Survey

Continued from page 19

by Network Equipment Technologies, Inc.'s Adaptive division.

"We don't want to be beld bostage to a proprietary solution," said Dave Grabski, manager of HBC Technology Systems at Hughes Aircraft Co., another user surveyed. "I have too many proprietary solutions today, and I can't afford them."

Hughes bas issued requests for proposal for a large corporate *ATM* network *[NW,* Feb. 8, page 1).

The ATM Forum's technical committee is finalizing a specification that, if implemented, would support interoperability between ATM products and services.

When asked what the forum could do to help them make the move to ATM, users ranked interoperability testing among vendors as the No. 1 priority. That was followed by conformance testing, standards development and an explanation of bow to cost-justify ATM purcbases (see story, this page).

MORE DETAILS

Users also detailed what speeds and features they want supported over local and long-baul ATM services.

Several respondents expressed concern tbat carriers are not responding to customers' needs for ATM services.

Grabski said the forum solicits user input and said be would like to see others follow its lead. "I don't see the common carriers doing the same thing, and that's where this all falls apart."

Added Sean Parbam, a project engineer with Motorola, "The carriers want to use ATM for their benefit for reducing infrastructure [costs], but we want those benefits, too."

"Public networks may be retarded by the lack of interoperability," said Dick Rothwell, a net manager for Dow Jones & Co., Inc. "We are concerned about bow public ATM will be offered and tariffed." ◻

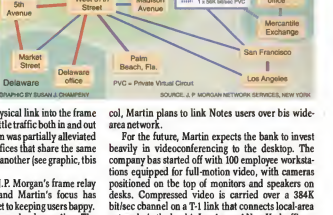
Frame relay

Continued from page 19

Nowell, Inc.'s Internetwork Packet Exchange (IPX). With IPX, which is a half-duplex protocol, the router must wait until it gets acknowledgment from the remote router that each packet has been received before it will send another packet.

So AppleTalk packets became stacked up behind IPX traffic, which created problems because AppleTalk is time-sensitive — the router would assume a packet was lost and would resend it if it did not receive a quick response. Martin solved the problem by giving AppleTalk a higher priority on the net.

To bold down the network's private virtual circuit costs, J.P. Morgan tried to minimize the number of its point-to-point connections. That created problems when remote offices tried to connect to one another through the server in one of the firm's New York offices. Because the New York server has only one physical link into the frame relay network, it cannot shuttle traffic both in and out simultaneously. The problem was partially alleviated by allowing some remote offices that share the same server to link directly to one another (see graphic, this page).



Despite the difficulties, J.P. Morgan's frame relay net is operational today, and Martin's focus has shifted from setting up the net to keeping users happy.

And J.P. Morgan's users can be demanding. The bank's traders average only two to three years on the job before burning out. With that kind of pressure, traders are willing to fight for the smallest advantage. Tbis maneuvering shows up in Martin's office when traders come to complain about a coworker's workstation being updated with new commodity prices a split second before their's is due to differences in the performance of their video cards.

J.P. Morgan is feeling the pressure, too. In some of its business lines, the bank is competing for clients in a pool of only 300 to 400 organizations. The goal for Martin is to use the network to provide the bank with a competitive edge.

To get that edge, the bank has adopted a "centers of excellence" philosophy where it recognizes each division's special talents. The approacb means that if the bank wants to trade deutsche marks, it will use its German office for the transaction. From a network planner's perspective, that philosophy means an increasing number of long-distance voice and data connections to support a very strong distributed net.

Other factors that bave shaped the current network have been the bank's increasing number of distributed databases built on client/server systems. One of Martin's challenges bas been to configure the frame relay net with the capacity and response times to bandle the distributed databases.

Another factor has been the rollout of Lotus Development Corp.'s Lotus Notes groupware software across the company. Version 2 of Notes only supported NETBIOS, so users communicated with one another via switched dial-up links. Now that Notes Version 3 supports TCP/IP, which is a routable protocol, Martin plans to link Notes users over bis wide-area network.

For the future, Martin expects the bank to invest beavily in videoconferencing to the desktop. The company bas started off with 100 employee workstations equipped for full-motion video, with cameras positioned on the top of monitors and speakers on desks. Compressed video is carried over a 384K bit/sec channel on a T-1 link that connects local-area networks in the bank's London and New York offices. The trial network also supports a LAN connection that allows users to simultaneously share and confer over Microsoft Corp.'s Excel spreadsbeets.

Martin believes videoconferencing will prove to be a "killer" application that will soon take over his organization. But be also said the service will be very expensive to roll out, estimating that arranging T-1 links to support videoconferencing for all traders would cost $20 million.

In an effort to address users' seemingly insatiable appetite for more bandwidtb, Martin plans to install Fiber Distributed Data Interface-based backbones to link LANs within buildings, as well as some FDDI to the desktop.

As for ATM, Martin wants the service to support X.25 and frame relay for bis legacy systems. He is also waiting for ATM network-to-network interface standards to be hammered out so be can communicate with clients on different nets. Once vendors have stable service offerings, that is when be'll consider integrating ATM into bis WAN. ◻

Users asking more of ATM Forum

Although generally pleased with the efforts of the ATM Forum to seek user input in order to prioritize its efforts, some users say the group needs to do even more to push the emerging technology.

"I applaud the ATM Forum for asking the user, What are your priorities, what do you see as hang-ups, and what direction do you want us to take?" said Dave Grabski, manager of HBC Technology Systems at Hughes Aircraft Co.

But Grabski would like the forum to take an active role in handling product testing and certification, while others want the group to work on different items.

"The forum must pursue global standardization of [Asynchronous Transfer Mode]," said Walter Gould, a senior telecommunications engineer at Boeing Computer Support Services, Inc.

"It's doing a good job, but [the ATM Forum] should redouble its efforts," Gould added.

Gould also said that the ATM Forum should work closely with ANSI to develop a standard for ATM.

"The forum is creating specifications that are driving the standards efforts," he added. "But we are deeply concerned about what the standards bodies ratify. The forum must be the one to push."

Some early ATM adopters want plain-English descriptions of ATM systems and network management.

"The forum needs to work more diligently at conveying in business terms — not in technical terms — what the status is of the various components that an ATM system [includes]," said Bud Huber, manager of strategic planning for Hughes Business Communications' telecommunications and space sector.

Ritch Lodge, a data communications consultant at Bell Sygma, wants the forum to address net management concerns. "I really believe that the forum should be specifying what is minimally required in any product for network management," Lodge said.

However, others want success stories.

"The most important thing I read anywhere is what I call actual case studies," said Jim Naylor, assistant vice president of network computing at Ascom Timeplex, Inc. "I attended a carrier user group conference recently where on each panel, a customer was brought to the table to share real-life experiences. That's invaluable."

➔BY BOB WALLACE

BRIEFS

Continued from page 19

exchange for submitting a network modernization plan.

Telepbone companies must commit to upgrading interoffice and distribution net lines to transmission rates of no less than 1.544M bit/sec by the year 2015.

AT&T announced that it has begun using optical amplifiers on a 150-mile route running at 1.7G bit/sec from San Francisco to Point Arena, Calif.

The amplifiers are more efficient and support transmission distances three times longer than traditional signal regenerators.

Unlike older signal regenerators, the new amplifiers do not require an optical-to-electrical conversion.

The new equipment will enable the carrier to offer bigher quality services and possibly to pass along savings realized from using the more efficient systems to users.

Traditional fiber-optic systems use regenerators that convert light to electrical signals, amplify the signals and then reconvert them to light every 25 to 30 miles.

The new devices, which are the size of a wallet, transmit more than three times the distance of traditional fiber systems.

BRIEFS

IBM Programming Systems recently said it would incorporate middleware technology from **Seer Technologies, Inc.** into its AdCycle application development software.

Seer's middleware runs on IBM MVS, OS/2 and AIX and SunSoft, Inc.'s SunOS and Solaris operating systems. It works with IBM's Systems Network Architecture, Transmission Control Protocol, Novell, Inc.'s Internetwork Packet Exchange (IPX) and Named Pipes network protocols.

The collaboration will enable IBM AdCycle users to generate multivendor, client/server applications.

CrossWind Technologies, Inc. will soon announce a Windows version of Synchronize, an enterprisewide scheduling and task management tool.

Synchronize runs on a wide variety of Unix servers and works with most Unix databases across Transmission Control Protocol/Internet Protocol nets. Synchronize costs $100 per user. The Windows client version will be available in November.

SHIPPING: ViewStar Corp. of Emeryville, Calif., recently began shipping ViewStar 3.1, client/server, document management and work flow development software. Version 3.1 enables developers to integrate on-line help functions within work flow applications and adds facilities to speed development of those applications. . . . **Lotus Development Corp.** of Cambridge, Mass., recently announced the availability of ccMail for OS/2 Workplace Shell, which takes advantage of OS/2 2.1's 32-bit processor and the Workplace Shell's graphical user interface and object-oriented capabilities. A 10-user pack costs $345, and a 100-user pack costs $3,295. Lotus also has begun shipping Version 2.0 of a gateway between ccMail and Unix mail systems via Unix-to-Unix Communications Protocol. The gateway is priced at $495.

AT&T Microelectronics, Go Corp., PenStuff, Inc. and Trimble Navigation, Ltd. have developed an application program interface (API) for building global positioning applications for hand-held computing devices running Go's PenPoint operating system. The PenPoint Global Positioning System (GPS) API will enable developers to build applications for hand-held devices, such as AT&T's Hobbit, that let users find their location on maps, navigate between sites, and obtain current traffic and weather information.

Go will publish the GPS API on its CompuServe bulletin board later this summer. PenStuff and Trimble Navigation will offer software developers' kits based on the API in the third quarter.

The kits will enable developers to integrate GPS into PenPoint applications.

AT&T: (408) 980-3797; Go: (415) 358-2075; PenStuff: (716) 461-3182; Trimble Navigation: (408) 481-8915.

Firm learns limitations of client/server systems

BY WAYNE ECKERSON

Hunt Valley, Md.

As a pioneer of client/server computing, PHH Fleet America learned the hard way about the capacity limitations of client/server systems and the lack of management tools for diagnosing problems.

Three years ago, the fleet management firm, based here, decided to downsize a mission-critical customer service application from a mainframe to twin IBM OS/2-based 486 servers on a Microsoft Corp. LAN Manager local-area network. The move was prompted by the need to give customer service representatives — who respond to an average of 3,000 calls a day — quicker access to maintenance records on the firm's 100,000 leased vehicles.

Accessing a Microsoft SQL Server database running on the OS/2 servers via DOS- and Windows-based personal computers, the representatives instruct PHH Fleet customers where to take vehicles that need repairs.

After reviewing vehicle maintenance records, the representatives authorize mechanics to make the repairs and arrange for payment.

"This service is very visible to our customers, and the systems that support it are critical to our fleet management business," said Mickey Lutz, director of technology management at PHH Fleet.

TOO LITTLE MEMORY

Pilot tests of the client/server system revealed that the 16-bit OS/2 486 servers lacked sufficient memory to handle a peak number of database lookups.

To compensate, PHH Fleet swapped out the 486 servers for Parallan Model 50 OS/2 servers, which add extensions to OS/2 that allow the operating system to support more than 16M bytes of memory, Lutz said.

The modification passed the laboratory tests, and PHH Fleet finally rolled out the system last August.

However, soon after it was implemented, the LAN Manager network began to crash for no apparent reason at increasingly frequent intervals.

"It's difficult to provide quality customer service when your network is down," Lutz said.

Even with Microsoft's help, it took more than a month to figure out the cause of the problem, which was an improperly set parameter within an OS/2 file, according to Lutz.

The lack of adequate monitoring and diagnostic tools for client/server networks

See **Client/server,** *page 24*

Rescuing client/server from disaster

To eliminate continual network crashes, PHH Fleet America swapped key components of its client/server system, which supports 100 on-line users taking 3,000 calls a day.

	Before	After
Clients	DOS and Windows on 386/486 PCs	Same
Database	Microsoft Corp. SQL Server	Sybase, Inc. SQL Server
Server hardware	486 PC	Sun Microsystems, Inc. Sparc10
Server operating system	OS/2 (16 bit)	Unix
Network	Microsoft Corp. LAN Manager	Novell, Inc. NetWare

SOURCE: PHH FLEET AMERICA, HUNT VALLEY, MD.

Users give green light for replication

BY WAYNE ECKERSON

The current trend toward distributed computing is forcing database managers to address the sticky problem of how to maintain the integrity of data while distributing it across the enterprise.

The ideal solution has been to employ a distributed database technology called two-phase commit that supports real-time, reliable updates across multiple, heterogeneous databases.

While that sounds great, the technology is too complex and carries too much overhead to make it practical for most users.

Database replication wares

Vendor	Software AG of North America, Inc.	Hewlett-Packard Co.	Sybase, Inc.
Product	Entire Transaction Propagator	Allbase/ Replicate	Replication Server
Databases supported	Software AG Adabas	HP Allbase/ SQL	Sybase SQL Server (others via C or COBOL interface)
Shipped	December 1992	June 1993	Fourth-quarter 1993
Pricing	$7,600 to $100,000	$2,400 to $23,400	$16,500 to $48,850

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: NETWORK WORLD

In place of two-phase commit, users are turning to a less sexy alternative called replication, which duplicates transactions across distributed databases but not in real time. Recognizing user interest in replication, vendors are just now starting to ship replication features in their mainline database management systems.

"We built two-phase commit and replication functions at the same time, and the overwhelming demand from users has been for replication," said David Wilde, information management program manager in the commercial systems division at Hewlett-Packard Co. in Cupertino, Calif.

HP, which began shipping a replication feature within its Allbase/SQL database last month, is one of three vendors to have shipped or announced shipping dates for replication services. The other two are Sybase, Inc. and Software AG of North America, Inc. (see graphic, this page).

Beta users of these vendors' wares are enthusiastic about the products. Most would have developed their own replication functions using batch file transfer or other technologies if the vendors had not deployed it in their products. Only those users supporting applications that need to maintain synchronized updates of data, such as airline reservation systems and some funds-transfer applications, are happy to say goodbye to two-phase commit.

"Sybase's Replication Server allows us to distribute transactions across a wide-area network without having to ensure that all sites are always available and the network is always up, which is the case with two-phase commit," said Moshe Bitton, software development tools manager at Rolm in Santa Clara, Calif.

ITS MANY USES

Users are putting replication services to work in a variety of ways. Some are using replication to store a mirror copy of mission-critical data for backup and recovery purposes. Others are replicating copies of regional data to a central site to maintain a corporate summary of data for decision support and analysis applications. Still other users are replicating subsets of corporate data to regional offices that use the data to run their business.

Rolm is deploying Sybase's Replication Server at several locations throughout the world to support a defect tracking system used by 1,500 Rolm engineers. Each site will maintain its own defect database, but changes in the data will be replicated to every site via the Sybase Replication Server. This will allow each site to access locally all defect data generated throughout Rolm.

Unlike most replication services shipped to date, Sybase's Replication Server can replicate data to and from non-Sybase databases. However, cross-platform replication

See **Replication,** *page 25*

RTG offers migration service, tools

BY BOB BROWN

Phoenix

Rankin Technology Group, Inc. (RTG) has introduced a new consulting service designed to help users migrate data from one database to another, including those downsized from mainframes to distributed network environments.

The ReTarGet service is based on a set of tools developed by RTG that the company will also offer separately, even though the company is pitching the tools primarily as part of a service.

Although moving data from one database to another is a fundamental requirement for users downsizing their systems, RTG President Doug Rankin said there are few tools on the market to help users out here.

"Typically, users manually input the data from one database to the new database or they write their own tools for a one-time conversion effort," Rankin said. "Either of these options is a long process wrought with errors."

The ReTarGet service can help users migrate data from one database to another about six times as fast as a user could do manually or by building its own conversion tools, Rankin estimated.

RTG's service is based on three tools — the Mapping Facility, Database Unload Facility and Conversion Program.

RTG begins by importing the schema definitions of the existing database, such as an IBM IDMS database, and target database, such as an Oracle Corp. Oracle7 database, into the ReTarGet Mapping Facility. The Windows-based software provides a logical view of each database and lets the person using the software define how one database maps to the other database.

The Database Unload Facility provides a formatted dump of the data from the legacy database. The Conversion Program uses the definitions garnered by the Mapping facility and the output from the Database Unload Facility to produce files for the target database.

RTG is building permanent libraries of schema definition programs to more quickly interpret data input by the Mapping Facility. So far, the company has built libraries for several IBM databases, as well as Informix Software, Inc. and Oracle databases. RTG plans to add support for others, such as Sybase, Inc.'s SQL Server.

RTG has its roots in the manufacturing systems business and has worked closely with Bull HN Information Systems, Inc. ReTarGet represents RTG's efforts to break away from the manufacturing and Bull markets to address a broader audience.

Peter Detrick, a consultant with the City College of San Francisco, plans to sign on RTG to help the college downsize from a Bull mainframe and proprietary IDS-II database to Oracle7 databases running on Hewlett-Packard Co. HP 9000/800 servers.

RTG, introduced to Detrick via HP, appears to offer an attractive service, especially given the college's financial need to migrate quickly from existing applications to reengineered, server-based applications.

"We're in a situation where we're paying too much for the mainframe software licenses and hardware and software maintenance," Detrick said. "The faster we can get off mainframe, the better."

RTG: (602) 997-6996.

Database schemas from an existing legacy database and a new target database are mapped against one another using the Mapping Program. The legacy database data is dumped into the Unload Facility. The Mapping and Unload Facilities pass their data along to the Conversion Program, which converts the data into files usable by the target database.

SOURCE: RANKIN TECHNOLOGY GROUP, INC., PHOENIX

GRAPHIC BY TERRI MITCHELL

Client/server

Continued from page 23

made it nearly impossible to troubleshoot the problem, he said.

In January, PHH Fleet decided to replace Microsoft's LAN Manager with Novell, Inc.'s NetWare. The move was partly a result of the network outages and partly because PHH Fleet had decided to standardize on NetWare for all client/server applications.

"The network outages confirmed our decision to standardize on Novell," Lutz said.

MORE TROUBLE LOOMS

However, this was not the end of PHH Fleet's troubles.

During the winter and spring, the company's call volume shot up about 40% due to business growth and a seasonal surge in activity that threatened to bog the system down once more.

"None of the vendors or consultants we worked with knew the upper limits of the pieces we were putting together to support our application," Lutz said. "Everyone said the application would work and have enough capacity to meet our business needs well into the future."

PHH Fleet decided to swap out the OS/2 Parallan servers for Sun Microsystems, Inc. Sparc10 Unix processors.

The firm made the cutover in May after devising a way to load data into the new system while simultaneously supporting the production application.

"It was like trying to fuel a jumbo jet while

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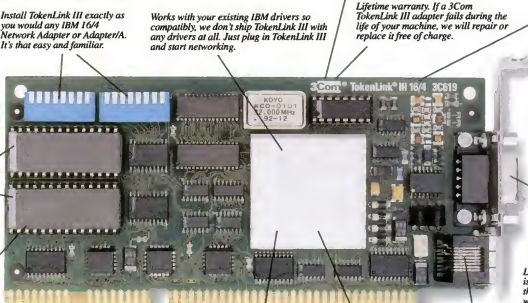

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in flight," Lutz said.

And the moving to Unix was much less complicated than Lutz had initially anticipated.

The database essentially stayed the same since Microsoft's SQL Server is the OS/2 version of Sybase, Inc.'s SQL Server. Both of the versions were developed by Sybase.

PHH Fleet also discovered that a single Sparc10 processor running Sybase SQL Server could hold all of the customer and vehicle information previously kept on two OS/2 servers.

PHH Fleet now uses the extra Sparc10 server as a hot backup and for development purposes.

In addition, PHH Fleet never had to train its programmers in Unix since the company relied heavily on Sun for help in cutting over the system.

DON'T FEAR UNIX

Lutz now believes that Unix is an ideal database server platform.

"Many traditional IBM shops are inhibited about going to Unix because it's a different operating environment," Lutz said. "However, only 5% of the Unix operating system is actually used to support databases, so the burdle is not as big as people think."

In addition, Unix brings with it many more diagnostic and management tools to trouble-shoot problems on client/server networks, and it is a scalable platform that will grow with the business, Lutz said.

As a result, PHH Fleet has now adopted Unix and Sybase SQL Server as a corporate standard for client/server applications, Lutz said.

Replication

Continued from page 23

requires users to write application code to a Replication Server interface in either C or COBOL, according to Berl Hartman, vice president of marketing at Sybase in Emeryville, Calif.

Like Sybase's Replication Server, HP's AllbaseReplicate and Software AG's Entire Transaction Propagator replicate transactions in remote databases, rather than sending copies of data or database tables across the wire. This would chew up too much bandwidth and bog down network performance.

All three databases also give users the ability to set the interval time at which transactions will be replicated across the network. Data can be replicated every five or 10 seconds, or once every day, week or month.

The Securities Industry Automation Corp. (SIAC) is using HP's Allbase/Replicate to provide on-line backup and recovery for a new order distribution system the data services firm is building at the New York Stock Exchange.

Avner Gelb, director and project manager at SIAC, said Allbase/Replicate offers many advantages over two-phase commit. It eliminates the need for applications to update two separate databases, which requires additional programming.

In addition, it supports near-time data updates, which is sufficient for backup and recovery functions.

The City of San Antonio, Texas, is using Software AG's Entire Transaction Propagator to facilitate the downsizing of a 911 emergency dispatch application from an Amdahl Corp. mainframe to two NCR Corp. 3450 Unix processors. The dispatch application relies on two critical Adabase files that must remain on the mainframe because they are used by numerous citywide applications.

To get around this, the city is going to periodically replicate the updates in the two Adabase host files — a geographic location file, which describes the characteristics of every address in the city, and a police personnel file — to Adabase files on the NCR processors. Being tested now, the city plans to roll out the application in the fall.

"It would have been extremely hard to build the replication process ourselves because we would have had to deal with complex networking issues like how to move data from an MVS platform to Unix," said Joe Stromboe, director of information services for the city.

Help desk

Continued from page 2

tic Link Library to take advantage of Windows memory and performance features.

In the case of a FoxPro application running under Windows, the application can utilize SequeLink to connect to VAX-based Ingres by using the TechGnosis Dynamic Data Exchange (DDE) Manager. The DDE Manager works in conjunction with all SequeLink products. SequeLink costs $5,900 to $147,500, depending on the number of licenses. You can call TechGnosis at (617) 270-0636.

Additionally, Charles Seiter, a member of technical support at Ingres in Alameda, Calif., replies:

Microsoft's Open Database Connectivity (ODBC) software addresses this requirement. Ingres' ODBC Driver software provides connectivity from the Microsoft ODBC Driver Manager to Ingres/Net on a Windows-based personal computer. Ingres/Net then connects to Ingres servers over a network. Essentially, the ODBC Driver Manager passes calls and information between the client application and the ODBC driver. The Ingres ODBC Driver maps the ODBC calls to Ingres calls and does the translation needed for the client software and Ingres/Net to pass information back and forth.

Microsoft FoxPro Version 2.5 for Windows requires the Microsoft Connectivity Kit for Windows to access ODBC-compliant data sources such as Ingres. Contact Microsoft Sales at (800) 227-4679.

The Ingres ODBC Driver software, the Microsoft ODBC Driver Manager software and installation software are included in the Ingres Networking for Windows package. A supported network protocol must be installed on the PC as well as the host server. The server must have Ingres/NET and Version 6.2 or higher of an Ingres server installed. Customers may buy a new copy of Ingres/Net for Windows 6.4/03 (net.win) for $100 and receive the ODBC software at no additional charge. For information on obtaining the Ingres ODBC Driver, users can contact a local Ingres office or Customer Sales representative, or call Ingres Direct Marketing at (800) 446-4737.

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Circle Reader Service #15

Editorial

Banyan Systems, Inc. is the little engine that could.

From the beginning, the company pegged its future in the local-area network market on directory services. While its peers were riding the explosion of departmental networking, Banyan was busy selling its vision of enterprise nets to corporate information systems executives.

Those must have been long and lonely days for Banyan sales folks. While landing some substantial enterprise business, they had to stand by and watch Novell, Inc. grow into a billion-dollar company on the strengths of its departmental solutions.

But the "I think I can" attitude looks like it may pay off or at least give the company a glorious moment in the sun. While struggling for several years, Banyan has succeeded in narrowing its focus to software — limiting hardware to a fraction of its $113 million in sales last year — and has boned its enterprise pitch, all in time for the heyday of directories.

With Novell's recent announcement of NetWare Directory Services in NetWare 4.0 and Microsoft Corp. promising directory support in Windows NT, Banyan is suddenly in the spotlight with the industry giants.

According to company Chairman and Chief Executive Officer David Mahoney — *see the interview with Mahoney in this issue* — the directory whirlwind being whipped up by Novell and Microsoft is driving chief information officers his way. Companies investigating LAN directories for the first time want to hear from a company that has been doing it for nearly 10 years.

It's an enviable position. But the question is, Will the company be able to capitalize on it? Won't it be hard to sell the Banyan Enterprise Network Services vision to a Novell shop?

Mahoney downplays the question by trying to position Novell and Microsoft in the same camp: fighting for the work group. Users can let those two slug it out down there, he says, and buy into Banyan's enterprise net services, which can support these and other work group environments.

That will be a tough sell given the size of the other players. But regardless of which vendor you ultimately side with, the fact is that Banyan offers a compelling LAN directory story that is worth hearing and gives you, the user, the ultimate advantage: choice.

Let us know where you stand on LAN directories by faxing us a letter, leaving a voice letter or messaging us on the Internet (see Contacts, page 2).

➡ JOHN DIX

Teletoons

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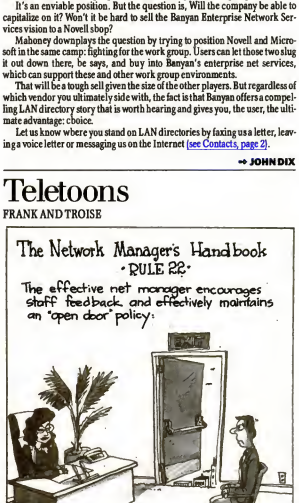

DISTRIBUTED COMPUTING

By John R. Rymer

Despite its strengths, IDAPI faces uncertain future

Despite its appeal, Borland International, Inc.'s Integrated Database Application Program Interface (IDAPI) faces the uncertain future of a technology that is long on vision and short on market presence. Unless IDAPI's proponents speed delivery of conformant products, there's a strong possibility that IDAPI will be steamrolled by Microsoft Corp.'s Open Database Connectivity (ODBC) in the race to become the dominant database API.

Borland's brainchild has support from more than a dozen independent software vendors (ISV), including such powerhouses as IBM, Novell, Inc. and WordPerfect Corp., which comprise a group called the IDAPI Initiative. IDAPI is an important attempt to make network access to all kinds of databases much simpler and more flexible than it is today.

IDAPI is a reference implementation of database-connectivity middleware that enables developers to build applications capable of accessing multiple different database management systems with greater ease.

For the network manager, IDAPI could reduce the number of database middleware products required to support data access, thereby reducing the network's complexity. For application developers, IDAPI should make constructing applications requiring heavy data access across many operating systems and networks much easier.

IDAPI serves a practical purpose for Borland: It allows developers to build client/server and other distributed applications that can access Borland's personal computer databases (Paradox and dBase) as well as its SQL DBMS (InterBase). Fortunately for Borland, IDAPI's support of transparent and powerful multidatabase access can also be applied across other vendors' database products.

Even with an API like IDAPI, accessing multiple databases of the same type, such as multiple relational DBMSs, is a difficult problem to solve. Accessing multiple databases of different types is even more difficult.

The solution bas to hide the differences among very different types of databases, between various database feature sets and even among different networking technologies.

Mixing information from SQL and indexed flat-file databases requires transformation of that data. Indexed databases are optimized to let users browse through them, while SQL databases are optimized to constrain user access to protect data integrity. Likewise, different databases use their own connection and session management software to support data access.

Borland's solution to this problem, IDAPI, is a two-part API with a supporting run-time environment. One part of the API gives developers SQL-type commands (such as SELECT) to transparently access both flat-file and relational databases. The other part gives developers "navigational" commands (such as GOTO) to access flat-file or relational databases. The run-time environment includes engines that receive these commands in the syntax of the application and converts them to the corresponding syntax used on the target database, thus giving the developer and user a seemingly homogeneous data access and manipulation environment.

IDAPI is an ambitious architecture. It not only defines an API but also consists of run-time engines that implement the API's functionality, such as conversion of data access and manipulation calls generated by applications into appropriate SQL dialect or other access methods, routing data requests to the proper database, caching, and session and connection management.

Moreover, the IDAPI Initiative members plan to provide reference run-time systems, which are prewritten software routines that other vendors can license for use in their own products.

However, Borland's strong technical vision has run head-on into two harsh realities.

First, Microsoft's ODBC bas taken the world by storm. ODBC is Microsoft's API for desktop data access, primarily to SQL databases. Despite the fact that there is no defined run-time implementation of ODBC, ISVs have chosen ODBC simply because it is Microsoft's standard for desktop data access.

Second, Borland's decision to seek partners to support IDAPI, though prudent, bas kept products implementing IDAPI from reaching the market. The IDAPI Initiative has tried to save time by basing IDAPI on the SQL Access Group's (SAG) API for SQL services, which provide a common access point to relational DBMSs for applications.

IDAPI implements the SAG's call-level API in its entirety, then adds new SQL- and navigational calls to it. But because the navigational API is Borland's own design and bad no prebuilt consensus in the industry, Borland bas to gain the sanction of the SAG or the X/Open Consortium, Ltd. to obtain such consensus. This will take more time. Meanwhile, ODBC products, which are based only on the SAG's API, are appearing on the market.

The irony is that while Borland is perceived to be fighting Microsoft's ODBC, the IDAPI technology might actually implement ODBC very well. Because ODBC is just an API, it needs high-quality database connectivity middleware to achieve its promise. IDAPI could be that middleware. That would be a better fate for IDAPI than to go down in flames as a footnote in the battle against Microsoft.

➡ Rymer is vice president of the Patricia Seybold Group in Boston and editor of the "Distributed Computing Monitor," a monthly report on distributed computing architecures, implementations and tools. He may be reached at (617) 742-5200 or via the Internet at jrymer@mcimail.com.

Tell us what you think

Do you strongly disagree or heartily concur with a *Network World* article? Tell us what you think by calling the "Letters to the Editor Hotline" at (800) 622-1108, ext. 461.

Letters

Data speed trap

I was pleased to see you drawing attention to the issue of mobile data speeds in the article titled "Advertised data speeds mask actual mobile data rates." (June 21, page 27). In fact, the speeds are even lower than ARDIS' quoted "usable" data rates. (ARDIS says its advertised 4.8K bit/sec service has a usable rate of 2,400 bit/sec while its advertised 19.2K bit/sec service has a usable rate of 13.4K bit/sec.)

The best case I have seen is about 2K bit/sec, with an average of around 1K bit/sec without compression. This reduction factor is not specific to RAM Mobile Data, Inc. but applies generally to the other packet systems. Cellular Digital Packet Data (CDPD) may be better, but we won't know until real systems using it are deployed.

You can observe these data rates using Performance Systems International, Inc.'s (PSI) PSILink service. During a session, you can watch the effective speed in bytes per second. When I was at PSI, the development team and I spent a lot of time breaking a lot of protocol rules to get the data rate as high as it is and were told by people that have measured other systems that PSI-Link is the fastest (as of three months ago, anyway).

Because of slow data speeds, most messaging services transmit and receive in the background. That way the user is not directly exposed to the low throughput.

There are two other areas I think need critical attention. The first is packet vs. circuit switching. The second is pricing analysis.

Wireless communications companies tout packetized data as superior to circuit-switched data. Packet-switched systems are certainly cheaper for the communications companies, but from a user perspective, the advantages are not as clear.

An example from the cellular phone system can illustrate this issue. Cellular phone systems are typically designed for a maximum 2% blocking rate. This means the system has enough capacity (calling channels) that when customers place a call, they only get a fast busy signal two times out of every 100 calls they attempt to make.

To get a 2% blocked rate 98% of the time there must be at least one idle channel 98% of the time. The need for idle channels means that at "maximum" usage about half of the raw capacity of the cellular system is sitting idle. The more available you make a system, the more excess capacity you have to build in.

This is why CDPD is a natural choice for cellular providers. The bandwidth is just sitting there. Why not fill it with packets? However, from a user's perspective, it means purchasing and managing more equipment to interface with the packet service.

This leads to the next question: Why should a user pay premium rates to send packets? To illustrate, consider the following scenario: If you transmit a million bytes of packet data at $.25 per 1,000 bytes, you'll spend $250. You can transmit the same amount of data over the phone in about 14 minutes (1,200 bytes per second, V.32bis, no compression). At $.20 per minute for long distance, you'll spend about $3.

Now transmit that data over a standard cellular phone using some of the new modems that are coming out and you can transmit the data in 56 minutes (300 bytes per second, a very low estimate). At $.70 per minute ($.50 for cellular plus $.20 for long distance), you'll spend about $40. Still a far cry from $250.

Packet data should be cheaper than the circuit-switched alternative, not more expensive. So why is packet data so expensive? Inquiring minds want to know.

Eric Jensen
Independent consultant
Pleasanton, Calif.

Defending X.500

When taking a look at the status and prospects of X.500 in a column entitled "Is X.500 really on a roll?" (June 21, page 35), author David Ferris states: "Things do not look good for X.500." I disagree.

In a companion article "Making X.500 work for you," Ferris defines X.500 as "a directory system standard that helps users working on diverse mail systems to exchange messages." This definition is far too narrow. The reason behind the excitement about X.500 is that it offers the basis for a very broad, open-ended range of applications, including messaging, but continuing far beyond that.

The X.500 standard was conceived as a general object repository. Messaging is an important application, but only one of many. Our company is working with customers applying X.500 to messaging, network management, distributed processing middleware, financial/business applications, telephone operator support, a C++ development system and others.

The end-user community has made it quite clear that it wants the endpoint of any directory migration strategy to be X.500.

Most messaging integration vendors acknowledge this and have announced X.500 migration strategies. Soft-Switch, Inc., for example, issued a white paper on how its directory synchronization system can be used as a path to X.500. In its OpenServer Application Guide, Retix states: "The Directory Exchange protocol (DX) has been designed as an interim step to X.500."

A group of large end users, meeting as the Open Systems Interconnection Implementors Workshop, have proposed the X.500 DISP protocol specifically to displace DX or similar protocols for directory synchronization.

These users want X.500 sooner, not later, and oppose proprietary intermediate steps.

In addition to multivendor interoperability, the beauty of X.500 is that all directory applications become part of an integrated whole. The effort expended to integrate messaging becomes part of the network infrastructure, not a stand-alone single-purpose system.

X.500 is no more complex to implement or operate than a proprietary application with the same purpose; it is a myth that X.500 is uniquely sophisticated or difficult.

The X.500 world is expanding at a very fast pace right now. We believe it's only the beginning.

Chuck Chriss
Executive vice president
AngeliSystems Corp.
Sonto Monica, Calif.

Assessing the new look

Let's get the complaint out of the way first: Heaven spare me from editors who say that changes to their publication will give it a "fresher look." That's what I see in the produce or meat sections of my grocery store. What, pray tell, does it mean when referring to a publication?

I don't see terribly much different, but nothing you've done is bad. What you've retained, and always should, are excellent graphics.

What you and most other network/telecommunications trade papers have, but newspapers all too often don't, is easy-to-read dark print.

What you don't have most of the time, and never should, is a sidebar with a color background so dark that the print is hard to read.

On another note, one thoroughly horrible situation in the industry, which is the subject of James Kobielus' recent Macroscope column titled "End-to-end support will require changes," (June 21, page 40), is end-to-end network management. I believe that this area is a fruitful subject for one (or more) of your multipage feature articles.

Steve Meyers
IBM
Boise, Idaho

Editor's note: We agree end-to-end network management is an important topic that requires in depth coverage. In fact, we recently ran an article that identified the key features of a distributed network management system [March 15, page 11] and o Buyer's Guide to Network Management Platforms [July 5, page 35]. We will publish in the December 13 issue o feature article that will examine the impact of the Open Software Foundation, Inc.'s Distributed Management Environment on user networks. As always, we'll have extensive coverage of network management issues in our news and technical sections.

ATM seminar gets high marks

Regarding your recent editorial on Asynchronous Transfer Mode (ATM) coverage (June 21, page 40): I recently had the good fortune of attending a seminar presented by Larry Lang, ATM product manager for Cisco Systems, Inc. It was by far the most objective, straightforward presentation on ATM I have ever heard.

Advantages, disadvantages, limitations, applications, case studies and standards issues were all honestly presented.

I learned more in that one seminar than in all the reading of the trade press I had done thus far. ATM, at this point, is appropriate in some situations but is far from the nirvana which the trade press has occasionally painted it as.

Larry is a founding member of the ATM Forum and speaks with a real understanding of implementation issues.

Try to catch him if you haven't already.

James Goldmon
Assistont Professor
Computer Technology Department
Purdue University
West Lafoyette, Ind.

NETWORK WORLD

Editor
John Gallant

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NEWS
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ENTERPRISE INTERNETS
Jim Duffy - Senior Editor
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14701 Boydton Sq. Centreville, Va 22020
Phone: (703) 830-8138 Fax: (703) 830-7963

LOCAL NETWORKS
Skip MacAskill - Senior Writer
Christine Burns - Staff Writer

Caryn Gillooly - Senior Editor
5423 Gladewright Dr., Centreville, Va 22020
Phone: (703) 266-1537 Fax: (703) 266-1543

Fredric Paul - Senior Editor
2068 Union St., Suite 2
San Francisco, Calif. 94123
Phone: (415) 771-4100 Fax: (415) 771-2817

GLOBAL SERVICES
Bob Wallace - Senior Editor

Ellen Messmer - Senior Correspondent
Phone: (202) 879-6732
Bill Burch - Washington Correspondent
Phone: (202) 879-6744
National Place
1331 Pennsylvania Ave. NW, Suite 505
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Network World
161 Worcester Road
Framingham, MA 01701
Phone: (508) 875-6400 Fax: (508) 820-3467
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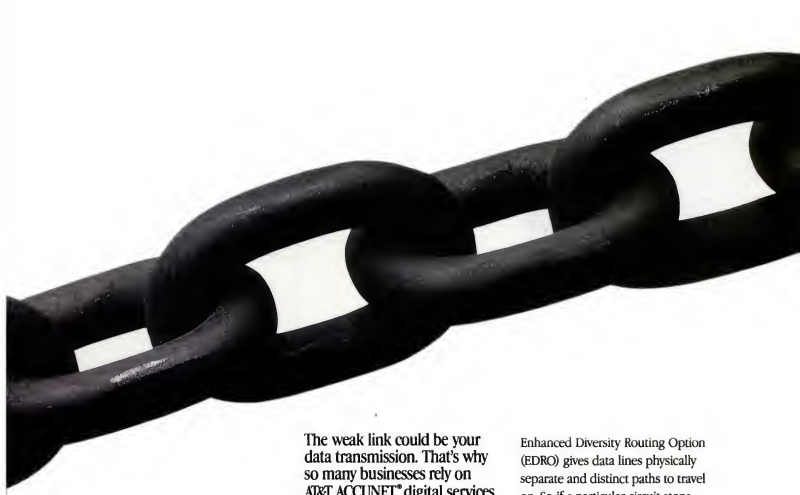

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Circle Reader Service #19

Buyer's guide

Exploding growth in options makes it harder to get a grip on Internet access

BY MARK MILLER

Getting a handle on the Internet is a lot like grabbing a handful of Jello, says Ed Krol, author of the informative and often entertaining *The Whole Internet User's Guide & Catalog.*

"The more firm you think your grasp is, the more oozes down your arm," Krol writes.

Indeed, the Internet is a complex web of information networks, bulletin boards disguised as news groups and other services that are becoming increasingly important for corporations to link up with remote users, business partners and customers.

Selecting the right service to provide internal users with access to the Internet can be a sticky proposition — all Jello analogies aside.

"It's plain the Internet is in an exponential growth phase now," says Vinton Cerf, coinventor of the TCP/IP protocol suite, vice president of the Corporation for National Research Initiatives in Reston, Va., and president of The Internet Society. Announcements of new services on the Internet are made daily, Cerf says, an indication that "traditional telecommunications carriers are waking up to the potential in a growing market."

And waking up they are. In preparing this Buyer's Guide, literally hundreds of Internet access providers surfaced, although only a handful are suited to meet the demands of large network users.

Krol sees this growth as a key challenge for Internet users. "This rapid-change era will make purchasing Internet services like buying a PC in the mid-'80s; by the time you get service installed, there will be better technology or a better deal for its delivery available."

The Internet, to many, is a collection of networks, based primarily on the Transmission Control Protocol/Internet Protocol suite, that carry data among organizations bound by common research and development projects. But the Internet has evolved into much more than that, and today there are numerous gray areas in which it is difficult to tell nonprofit research data from commercial traffic.

As a result, scores of companies are coming to market with services that give commercial users access to Internet services and provide network highways to bypass areas of the Internet that operate with certain policies that prohibit some commercial traffic.

Once connected to the Internet, users gain entry to a world of data services and databases, many of which are worldwide in scope and available via file transfer and electronic mail services.

TELLING PROVIDERS APART

If the Internet is to be a key element in any company's business strategy, then Internet access providers become pivotal to that plan. The kicker for companies just investigating the merits of the Internet is that, like long-distance companies of a decade ago, some access providers offer more comprehensive service than others.

For any network manager considering access services for corporate end users, several top selection criteria come into play. The two most important are a service provider's geographic coverage, and service and support.

Outside of those two, users should consider access options, international links, host availability and application support, in addition to pricing alternatives. For multilocation enterprises, the ability to negotiate a nationwide contract that covers all cities can be a real plus.

Segregated almost entirely by their services' geographic coverage, Internet access providers can be divided into three classes: national, regional and local.

National providers are in the business as a commercial venture, selling Internet access in numerous cities across the country. These service providers are noted for unrestricted traffic, direct connections — or gateways — to other domestic or foreign networks, enhanced applications such as data security, and consulting and support services.

These companies typically provide a long list of advanced services and are quite capable of handling the Internet access needs of major companies with offices worldwide.

They include such companies as Advanced Network and Services, Inc. (ANS), Performance Systems International, Inc. (PSI), Sprint Corp. and UUNET Technologies, Inc.

Regional providers were originally funded by the National Science Foundation (NSF), but many now receive funding from commercial sources, as well. Coverage is typically provided in a few contiguous states, with toll-free dial-up access so users can use the service from virtually anywhere in the U.S. without piling up toll charges, although Internet connection-time rates do apply. Historically, regional service has been heavily weighted toward supporting users in the higher education and research communities. Such providers include the New England Academic and Research Network (NEARNET) and the Midwestern States Network (MIDnet).

The low end of the market is populated by hundreds of state and local providers that cover a more reduced area and may vary widely in the services offered. State-sponsored networks often provide inexpensive dial-up access and offer user accounts to support such things as file transfers and remote host access. Local providers' services may be much more limited and offer E-mail accounts only, although some, such as The Whole Earth 'Lectronic Link — also known as the Well — in Sausalito, Calif., and The World, by Software Tool & Die, Inc. in Cambridge, Mass., offer diverse application services.

The great debate

To select the optimum access provider, network managers need to do their homework and consider the pros and cons of working with any one provider.

Bill Yundt, executive director of the San Francisco Bay Area Regional Research Network (BARRNet), a regional network headquartered at Stanford University and serving northern California and Nevada, sees regional

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Staying anonymous

One of the great strengths of the Internet is its ability to extend applications from a single user or local-area network to the rest of the world.

Three application protocols, all based on the Transmission Control Protocol/Internet Protocol, are currently used on the Internet. Electronic mail applications use the Simple Mail Transfer Protocol, access to remote hosts is via the Telecommunications Network Telnet protocol, and files may be transferred using the File Transfer Protocol (FTP). Special applications of these protocols make global internetworking that much easier.

For example, much of the documentation of the Internet is available electronically. In many cases, the provider makes the information available to anyone on the Internet, using anonymous FTP. For example, to obtain a request for comments (RFC) document , the user would use FTP to access host nic.ddn.mil, change to the RFC directory, and retrieve the desired file, RFC1462.txt. Commands entered by the user would be:

```
ftp nic.ddn.mil
login: anonymous
password: e-mail address
cd rfc
get rfc1462.txt
quit
```

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Continued from page 31

service provisioning as a way to meet end user requirements.

"Since we are chartered as a service to the end users, we are governed by their input," Yundt says. "This helps us better meet the needs and priorities of this region and its research, educational, governmental and commercial communities."

A national provider, however, may be better suited, in some cases, for large companies. "Businesses are rapidly becoming aware that well-thought-out, efficient and economical wide-area networking is essential to the future prosperity of the organization," says Joel Maloff, vice president of client service at ANS in Ann Arbor, Mich. "The choice of networking services should not be based on the origins of the organization [commercial or government-sponsored]; rather, it should be based on functional capabilities, services provided, international access and business criteria, such as cost."

No matter which way you cut it, a thorny issue, in the form of Acceptable Use Policies (AUP), is at the heart of any service comparison.

What's acceptable?

When users purchase long-distance telephone services, few restrictions are placed on the type of traffic the customer sends. As long as customers pay their monthly bills, providers remain happy.

The Internet, however, is not that simple. Network managers who don't want restrictions on the kind of traffic they send over the Internet might be able to rule out whole classes of providers. That's because many parts of the Internet were developed with government funds, and use of these facilities is restricted to research and educational purposes. That means certain policies disallow transmission of information used for commercial gain. These restrictions come in the form of AUPs, which are often vague and vary between networks.

> "It is incumbent upon the client organizations to assure their traffic complies with any AUP," CERFNet's Mohta said.

The NSF Network (NSFNET) AUP, for example, states as a general principle: "NSFNET backbone services are provided to support open research and education in and among U.S. research and instructional institutions, plus research arms of for-profit firms when engaged in open scholarly communication and research. Use for other purposes is not acceptable."

The terms "research and education" are certainly open to interpretation. Therefore, network managers who want to play it safe often select commercial, for-profit access providers that bypass restricted areas of the Internet with their own backbone nets.

There are no current technical solutions for policy-based routing, according to Pushpendra Mohta, director of engineering at the California Education and Research Federation Network (CERFNet), a San Diego-based regional provider covering many Western states.

"It is incumbent upon the client organizations to assure their traffic complies with any AUP," Mohta says.

April Marine, of NASA's Network Applications and Information Center at Moffett Field, Calif., and author of the book "Internet: Getting Started" (SRI/Prentice Hall, 1993), expects to see a melding of the commercial and government-sponsored sectors in the near future. "As the 'traditional' Internet, which historically has been government-sponsored, develops more applications and services that are attractive to people, the commercial sector will [also] want to provide access to these applications and services," Marine says.

In an effort to promote commercial use of Internet services, a number of commercial and regional access providers have banded together as the Commercial Internet Exchange Association (CIX). This matrix of interconnected commercial networks provides Internet users with the option of bypassing government-sponsored facilities and, therefore, exempts them from any AUP restrictions.

These independent networks provide all of the same application services available on the Internet and can pass traffic to any part of the Internet.

GEOGRAPHY LESSONS

Acceptable use regulations aside, one of the two major criteria for selecting Internet access providers is the breadth of service coverage. While some vendors have a national presence, others serve only a specific region or just a single city.

This may prove to be a pivotal criterion for a company with branch offices spread across the U.S. or even abroad.

Service providers that offer national coverage can provide service and technical support to domestic users, mitigating the need for a net manager to intercede.

National providers, including ANS, PSI, Sprint and UUNET, have points of presence (POP) in many metropolitan areas across the country. The number of these locations varies;

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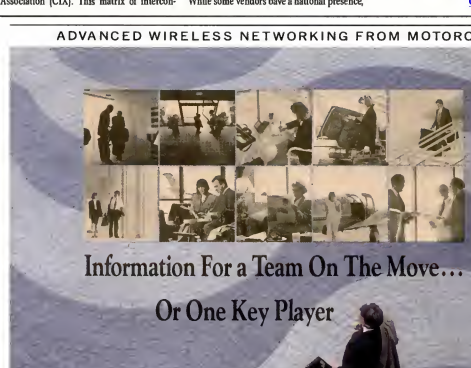
ADVANCED WIRELESS NETWORKING FROM MOTOROLA



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Circle Reader Service #2

Internet access services

Provider	Service	Service area: NE = Northeast; SE = Southeast; MW = Midwest; W = West; U = U.S.	Maximum speed supported per access method: Direct foreign links	Dial-up (K bit/sec)	Leased-line (M bit/sec)	Frame relay (bit/sec)	SMDS (M bit/sec)	X.25	Other access options: Toll-free dial-up	Integrated T1 access	Transport protocol: O = OSI; T = TCP/IP; X = Other	Access protocol: P = PPP; S = SLIP; X = Other	TCP/IP host provision: C = By customer; P = By provider	No. POPs	Networks accessed via direct gateways: A = Alternet; C = CIX; E = ESnet; S = SURAnet; I = Internet; N = NSFNET; O = Other	Applications and services provided: CIX member	Archie	E-mail	FTP	Gopher	Home pages	Telnet	X.500	Security: E = Encryption; U = User authentication; O = Other	Agency service	Additional fees	Pricing: Access charges by access method: A = Analog; F = Frame relay; L = Leased lines; S = SMDS; X = X.25
Advanced Network and Services, Inc. (ANS) (914) 789-5300	ANS CO+RE Services	U	4	14.4	45	1.54 M	45	4	✔	✔	O, T, X	P, S	C	13		N, O		✔	✔	✔		✔	✔	E, U	✔	✔	A: $25/month plus hourly L: $15,500/year F: (1) S: (1)
San Francisco Bay Area Regional Research Network (BARRNet) (415) 725-1790	BARRNet	W	0	28.8	45		1.5		✔	✔	T	P	C	14	A, C	A, N, O	✔		✔	✔		✔	✔	E (2), U, X	✔	✔	A: $2,400 - $4,100 L: $2,400 - $31,300
California Education and Research Federation Network (CERFNet) (619) 455-3900	CERFNet Dedicated Line Services	W	3		45		45				O, T, X	P, S	C	9	C, E	N, O	✔	✔	✔	✔	✔	✔	✔	U, X	✔	✔	L: $1,300 - $2,000
	Dial 'n Cerf	U	3	14.4					✔		T	P, S	P	9	C, E	N, O	✔	✔	✔	✔	✔	✔	✔	U, X	✔	✔	A: $250 - $600/month, $3 - $10/hour
Committee on Institutional Cooperation Network (CICNet) (313) 998-6103	CICNet	MW	0	14.4	1.54		1.54				O, T	S	C	8	E	A, N		✔	✔	✔	✔		✔	X	✔	✔	A: $35 - $350/month plus hourly L: $7,000 - $12,000/year
Global Enterprise Services, Inc/ Northeastern Research Regional Network (JvNCnet) (800) 358-4437	Global Express	NE	4	9.6	1.54		1.54		✔	✔	T	S	C	12	C, E	N	✔	✔	✔	✔	✔	✔	✔	U, X	✔	✔	A: $500 L: (1) S: (1)
Midwestern States Network (MIDnet) (402) 472-7600	Internet Connectivity	MW	0	14.4	1.54				✔		T	S	C	12		A								X		✔	A: $60 - $208 L: $2,500 - $5,000
New England Academic and Research Network (NEARNET) (617) 873-8730	NEARNET	NE	0	14.4	10	56M					O, T, X	P, S	C	6	A, E	A, N	✔	✔	✔	✔	✔	✔	✔	X	✔	✔	A: $250 - $350/month L: $900 - $2,000/month F: $900/month McGovern: $4,800/month
Northwestern States Network (NorthWestNet) (206) 562-3000	NorthWestNet	NW	1		18						T		C	9	E, C	N	✔		✔	✔		✔	✔			✔	L: $15,000 - $45,000/year
Performance Systems International, Inc. (703) 904-7187	InterFrame	U	0			512 K				✔	T	X	C	33	A, S	I, N, O	✔		✔	✔		✔	✔	✔			A: $50/month
	LAN-Dial Services	U	0	19.2							T	P, S	C	38	A, S	I, N, O	✔	✔	✔	✔		✔	✔	✔			A: $275/month
	PSILink	U	0	19.2						✔	T	X	C	33	A, S	I, N, O	✔	✔	✔	✔		✔	✔	✔			A: $125/month
	World-Dial	U	0	14.4							T	X	C	33	A, S	I, N, O	✔	✔	✔	✔		✔	✔	✔		✔	A: $1.25 - $6.50/hour
Sprint Corp. (703) 904-2187	SprintLink	U	11	14.4	10	56K		19.2	✔	✔	T	P, S	C	300		N, O	✔					✔		U	✔	✔	$50 - $6000 (3)
Southeastern Universities Research Association Network (SURAnet) (800) 787-2638	Internet Networking Services	SE	2		45		45			✔	O, T	P, X	C, P	19	A, E	A, N, O		✔		✔		✔	✔	U, X	✔	✔	L: $4,500 - $25,000/year S: $13,000/year
UUNET Technologies, Inc. (703) 204-8001	AlterNet TCP/IP Network service	U	8	14.4	10	1.5M	1.5		✔	✔	O, T, X	P, S, X	C	14	C, S	N, O	✔		✔	✔		✔	✔	E, U, X	✔	✔	A: $250 - $500 - $2,000 F: (1)
Southwestern States Network (WestNet) (303) 491-7260	WestNet	W	1	14.4	45	1.54 M	1.54	56	✔		O, T	P, S	C, P	8		N											(1)

Products highlighted by color were selected for The Short List.

FOOTNOTES:
(1) Vendor declined to provide standard price.
(2) Features provided optionally at an extra cost.
(3) Sprint's pricing depends on the connection speed, not the access method.

CIX = Commercial Internet Exchange
ESnet = Energy Sciences Network
FTP = File Transfer Protocol
NSFNET = National Science Foundation Network
POP = Point of presence
PPP = Point-to-Point Protocol
SLIP = Serial line interface protocol
SMDS = Switched Multimegabit Data Service

SOURCE: NETWORK WORLD

The Short List

Internet access services

The Short List highlights products Network World *recommends you examine during the selection process for Internet access services. Offerings were selected based on their range of geographic coverage, access methods, infrastructure, breadth of applications, and service and support.*

Nationwide services

ANS CO+RE Services, from Advanced Network and Services, Inc. (ANS), has several strengths, particularly its backbone net, which is exclusively based upon T-3 leased lines. Connections to the service are available from anywhere in the country through 13 major nodes. Toll-free, dial-up access is available within the continental U.S., at speeds of up to 14.4K bit/sec. Dedicated lines to Canada, Mexico and Europe are available through direct ANS connections or via alliances with partners worldwide.

ANS CO+RE Services' strong suit is its network security services, called InterLock. This is a suite of application-level security facilities that control network access between segments of an organization's private network or between a private network and the public Internet. Applications supported under Interlock include Telnet, File Transfer Protocol, Simple Mail Transfer Protocol (E-mail), Network News Transfer Protocol, X Window System, Card Key Authentication and end-to-end data encryption.

Access to each of these services is controlled by the client's site security administrator. Users may be authenticated by the user identification, time of day, day of the week, and private/publice network or host address. Network Data Encryption, based upon the Data Encryption Standard is also available between two InterLock locations.

SprintLink, operated by Sprint Corp., offers Internet connectivity via 300 locations in the U.S. SprintLink is available at every Sprint point of presence (POP) and may be integrated with other Sprint services between that POP and the customer premises. For example, a customer's T-1 link could be divided between voice, private data and Internet traffic. SprintLink is likely to appeal to those users who implement their own Internet hosts and are interested solely in connectivity services. SprintLink is not the answer for users who want to establish accounts on a provider's Internet host and use its array of applications services.

SprintLink provides direct connections to commercial Transmission Control Protocol/Internet Protocol nets in 12 countries across Europe, South America and the Pacific Rim. Sprint also allows the customer to choose from a variety of network access protocols, including dial-up, X.25 and frame relay. Sprint plans to move the service to an Asynchronous Transfer Mode backbone in 1994, with migration to Synchronous Optical Network by 1995.

Regional services

CERFNet, the California Education and Research Federation Network, distinguishes itself by the number of network access alternatives available in the California area. CERFNet has two prime service offerings: CERFNet Dedicated Line Services and Dial n' Cerf.

CERFnet was the first Internet service provider to offer Switched Multimegabit Data Service access to its customers and will be adding Switched 56 and ISDN access this fall. The Dial n' Cerf offering provides both access to CERFNet terminal servers and dial-up IP service on a national level. Toll-free, dial-up access to the Internet, via the Dial n' Cerf offering, makes it feasible to use this service on a nationwide scale without incurring substantial local-access charges. A menu-driven interface assists new users with access to a broad range of Internet applications. CERFNet also provides 24-hour-a-day network operations center support, a toll-free help desk and offers agency service agreements.

Continued from page 33

ANS, for instance, has 13 POPs, and Sprint touts more than 300.

Regional providers, by contrast, generally have a presence in one area of the country (see chart, page 34).

One important point to consider is that net managers can act as a contractor and job out Internet access to multiple regional providers, or even state or local service bureaus.

Another purchase consideration is direct links to international locations. For example, regionals CERFNet and the Southeastern University Research Association Network (SURAnet) provide access to Mexico and Korea, and South American locations, respectively.

ACCESS METHODS

While geographic coverage is certainly a concern of anyone evaluating Internet access service providers, another related factor is what type of access the provider offers. And here is where users can begin to tell service providers apart.

Toll-free

Many access providers, including ANS, BARRNet, CERFNet and MIDnet, offer toll-free access numbers, which come in handy for mobile users.

Toll-free services help corporate users skirt local-access charges by paying a single charge to the Internet access provider for a service that includes 800 access.

In some cases, such as CERFNet, toll-free access makes these providers an alternative to nationwide service companies, such as Sprint or UUNET. Since users do not incur local-access charges to dial into the provider's Internet host, regional providers' services can be accessed from virtually anywhere in the U.S. Of course, don't be surprised if connect time charges are slightly higher, since someone has to pay for those toll-free phone lines.

Corporate users also may be interested in throughput requirements than casual users that find terminal server access adequate.

Typical speeds for these connections range from 14.4K bit/sec for analog dial-up service to T-1/T-3 rates for dedicated lines. Notable

Finding local Internet access providers

In addition to these listed below, hundreds of Internet access providers service only 1 city. Lists of these providers are available, either by telephone or directly over the Internet.

Provider	Telephone	E-Mail address	Directions
InterNIC	(800) 444-4345	info@internic.net	Download the files "North American Intsmet Access Providor List" and "Public Dial-up Internet Access List."
SRI International	(415) 859-6387	nisc@sri.com	Download the file "internet-access-providers-us.txt," from directory "/ietnnfo" on host ftp.nsc.sri.com using anonymous File Transfer Protocol.

SOURCE: MARK MILLER, DISINET CORP., BROOMFIELD, COLO.

full TCP/IP connections to the Internet. This could be used to distribute Internet access to multiple workstations on a local-area network or across the enterprise network. These types of connections allow end users to set up their own Internet host, instead of tapping into an Internet node at the service provider's POP. Also, full TCP/IP connections imply that users gain access to a full suite of Internet services, including Telnet and File Transfer Protocol — not just E-mail.

The option of establishing an Internet node on a corporate site may prove costly to some users, but the advantages of an Internet node, complete with a company's own Internet address, may offset the fiscal issues. For instance, a peer connection on the Internet has the advantage of file transfers or remote access directly to that host.

Accounted for

By contrast, another option available to companies is to establish individual user accounts on an Internet host located at the service provider's premises. Users dial into a terminal server that establishes a session with the host. With terminal server access, a file transfer from across the Internet is sent to the access provider's host, the file is then downloaded using another file transfer protocol such as Xmodem to the user workstations. The peer connection eliminates this second step and may be advantageous for heavy users.

When companies choose to establish their own Internet node on site, they typically install a router on the premises and a dedicated circuit into the Internet. The router must support such protocols as the Interior Gateway Routing Protocol or Border Gateway Protocol. In many cases, the access provider recommends, or may even supply, a particular router, thus assuring compatibility at both ends.

The other type of full TCP/IP connection uses software running either the Serial Line Internet Protocol (SLIP) or the Point-to-Point Protocol (PPP) at both the customer and access provider ends. A telephone line plus high-speed modems are used for the link. As above, a SLIP/PPP connection allows file transfer or remote access directly to the user's Internet host without an intermediary. This is typically used by single workstations that have higher

among the providers is CERFNet, which offers leased lines between 56K bit/sec and 45M bit/sec, Switched Multimegabit Data Service connections at T-1/T-3, and will offer Integrated Services Digital Network service beginning in the fall of 1993.

A handful of Internet access providers offer other access methods. Sprint's SprintLink, for instance, is available over T-1 or X.25 lines, and PSI's InterFrame service is available over frame relay circuits.

Users with atypical access needs shouldn't be afraid to ask about access methods since there are some unusual alternatives available.

John Curran, a network analyst at NEARNET in Cambridge, Mass., a regional provider that serves the Northeast region, says the provider even offers 10M bit/sec transmission via point-to-point microwave links. "While TCP/IP applications generally will perform over any media, certain applications, such as packetized video and data visualization, perform particularly well over this infrastructure."

The point is that users with atypical access needs shouldn't be afraid to ask, since there are some unusual alternatives available.

In addition to the regular TCP/IP, SLIP and PPP connections, several networks currently offer or have planned support for OSI transport. These include ANS CO+RE Services, CERFNet services and NEARNET, as well as Global Express offered by Global Enterprise Services, Inc./Northeastern Research Regional Network (JvNCnet).

Continued on page 36

Other Internet access providers

In addition to the Internet access providers shown in the Buyer's Guide chart on page 34, the NSFNET has affiliated regional and state networks.

Provider	Service area	Telephone	E-mail address
Colorado SuperNet	Colorado	(303) 273-3471	info@csn.org
MichNet	Michigan	(313) 764-9430	jogdon@merit.edu
MRnet	Minnesota	(612) 342-2570	dfazio@mr.net
NevadaNet	Nevada	(702) 784-6133	zittrer@nevada.edu
NewMexico Technet	New Mexico	(505) 345-6555	reynolds@technet.nm.org
NYSERNet	New York	(313) 998-3120	info@nysernet.org
OARnet	Ohio	(614) 292-8100	toc@oar.net
PACCOM	Hawaii	(808) 949-5395	torben@hilo.ics.hawaii.edu
PREPnet	Pennsylvania	(412) 268-7870	twb+@andrew.cmu.edu
PSCNET	Northeastern states (Ohio, Pa., W. Va.)	(412) 268-4960	pscnet-admin@psc.edu
SDSCnet	California	(619) 534-5043	lovejoy@sds.sdsc.edu
SESQUINET	Texas	(713) 527-4988	farrell@rice.edu
THEnet	Texas	(512) 471-5046	tracy@utexas.edu
VERnet	Virginia	(804) 924-0616	jb@virginia.edu
WVNET	West Virginia	(304) 293-5192	cc011041@wvnvms.wvnet.edu
Wiscnet	Wisconsin	(608) 262-8874	lad@cs.wisc.edu

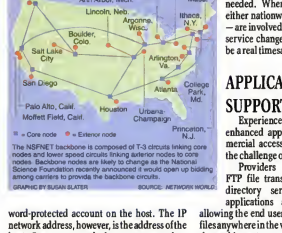
SOURCE: MARK MILLER, DISINET CORP., BROOMFIELD, COLO.

Continued from page 35

Large corporate customers with high traffic demand flexible access options, but also become concerned with the speed of the access provider's backbone. Of the vendors surveyed, only ANS indicated an average backbone speed at the T-3 line rate of 45M bit/sec, with T-1 backbone speeds being much more common among service providers.

Redundancy of that backbone, plus the access speeds available to that backbone, are also good questions to ask if the Internet connection is intended to support mission-critical applications.

The easiest access option is a dial-up connection into a terminal server attached to the access provider's host, operating at speeds of 2,400 to 14.4K bit/sec. The end user provides the workstation, modem and terminal-emulation software. The access provider sets up the user with an Internet mail address and a pass-



word-protected account on the host. The IP network address, however, is the address of the host. Once connected, the remote user then has full access to the network's features, functions and services.

Gateways abroad

A direct connection, sometimes called a gateway, is a communication facility maintained by the local access provider that connects its net to regional networks or overseas nets.

While users can send data over the Internet's NSFNET backbone, AUP restrictions may impede transfer of the traffic to its destination. As a result, Internet access providers who offer direct gateways to regional providers or other nets can assure users that data will reach its destinations in a timely manner.

Steve Miller, AlterNet TCP/IP Network engineering manager at UUNET, an Internet access provider in Falls Church, Va., advises that the network be designed with direct connections to frequently-accessed locations.

"Direct connections are more reliable than indirect ones, as they have fewer elements that can fail or cause service disruptions," he says.

For time-sensitive applications, such as large file transfers or remote host access, direct connections results in less delay in delivering the message, which yields a higher quality of service to the end user.

"Some networks, both domestic and foreign, may not be reachable via the NSFNET backbone. Direct connections may thus be required in order for some sites to communicate. In addition, if direct connections support commercial traffic, a clean solution to the NSFNET AUP issue is automatically provided."

HAND HOLDING

Another key issue in differentiating Internet access services is the distinction between Internet connectivity and Internet services. All access providers offer Internet connectivity, via dial-up or leased lines. Internet service and support may vary widely, however.

As a communication infrastructure, the Internet is based upon a number of technologies that novices may find challenging, or even imposing. One of these is its strong basis in the Unix operating system.

A provider that demonstrates a willingness to walk a new user through his or her first Telnet session should be considered a real plus.

Many providers will assist with the procurement of leased lines from the local exchange carrier and include that fee in their monthly statements. Technical assistance with installation and configuration of site-specific hardware, such as modems and routers, may also be needed. When multiple locations — either nationwide or within one region — are involved, the ability to coordinate service changes with one provider can be a real timesaver for the net manager.

APPLICATION SUPPORT

Experienced Internet users demand enhanced applications, and the commercial access providers are rising to the challenge of meeting that need.

Providers typically offer E-mail, FTP file transfer, Telnet session and directory services. Other popular applications are database services, allowing the end user to locate other users or files anywhere in the world. One such means is the archie system, which was developed at McGill University in Montreal.

The archie system allows a user to search for files that are available on anonymous FTP servers on the Internet. (For more information on anonymous FTP, see story, page 31). Archie may be accessed in one of three ways: via Telnet, a local archie client or E-mail. Access to a remote archie server via Telnet should have faster response times if that server is geographically close. ANS and SURAnet provide archie servers for their customers.

Another popular information resource is the Internet Gopher system, a menu-driven information browser developed at the University of Minnesota. Gopher servers store a wide variety of information, from phone hooks and news to recipes and weather reports. To access the Gopher system, a user's host must have a Gopher client package. Gopher client software is available for most workstation environments via the Internet on host hoombox.micro.umn.edu in the directory pub/gopher.

Yet another advanced service, the Wide Area Information Service (WAIS) is a distributed text-searching system based on the ANSI Z39.50 standard. WAIS allows the user to enter a sequence of words and then searches archives for occurances of those words. Unlike Gopher, which is menu-driven, WAIS automates the search process. Similar to Gopher, WAIS requires a client program on the local workstation or host to access the system.

National providers supporting archie, Gopher or WAIS include ANS and PSI, while regional providers include CERFNet, GES/JvNCnet and SURAnet. The Buyer's Guide chart breaks down providers' support for these applications.

One other set of important applications offered, especially for corporate users, is security services. These may include integrity checking, authentication and encryption technologies. Of the Internet access providers surveyed, ANS InterLock security services help secure such applications as Telnet, FTP, SMTP (E-mail), Network News Transfer Protocol (NNTP) and X Window System sessions. Network Data Encryption, based upon the Data Encryption Standard (DES) is also available between two InterLock locations.

In addition to ANS, BARRNet, CERFNet and UUNET also have encryption services available. User authentication is supported by GES/JvNCnet, Sprint, SURAnet and UUNET.

T-1 at the same time."

Pricing plans vary immensely, from a flat rate per month with additional usage charges, to a simple flat rate based upon line speeds. Other mitigating factors may include the type of customer (commercial vs. nonprofit), access method and speed, number of user accounts required and connect time. Add to that costs for access lines and associated hardware, and monthly charges can grow quickly. Homework in this particular area can reap large dividends over the term of the contract.

One pricing issue worth investigating with Internet access providers is the concept of agency agreements. Under such a plan, the provider gives a customer with multiple sites

Society reaches out

The Internet Society, which includes in its objectives the continued expansion of the Internet on a global basis, as well as fostering and supporting the evolution of technical standards used on the Internet, receives queries daily from all over the world.

Typical queries include: "How do I get on the Internet?" and, "What do I do when I get there?"

The questions come not only from industrial, government and educational sectors.

Increasingly, the society hears from parents who want to correspond with their children at college, from people starting new businesses who want the connectivity to suppliers and customers, from people interested in using the Internet for distance learning (and teaching) and even from attorneys who want to hang their shingles in cyberspace.

There is a strong trend toward globalization in all aspects of the Internet. Some of the most rapid growth is coming from outside the U.S. Domestically, the focus of attention on the potential for a national information infrastructure has galvanized Internet growth.

The U.S. government has several very important roles it can play. The research-sponsoring agencies — the National Science Foundation, the Advanced Research Project Agency, the Department of Energy, the National Aeronautics and Space Administration, the National Institutes of Health, the Department of Agriculture and the Department of Defense — can lead by supporting new technology and applications development for the research and development sector.

The other parts of the federal government can lead by putting their agencies up on the Internet and opening up communications with the public.

The Internet Society also invites private-sector businesses to become sponsors of society efforts, especially work on standards, and invites individuals to become members of the society.

As Internet Society members, corporations gain access to the Internet for R&D efforts as well as for developing communications standards.

Corporations interested in joining the society should expect to pay $20,000 in 1993 as a founding member and $10,000 a year after that. Start-up companies are given a break, with fees of just $1,000 for each of the first three years. Nonprofit organizations receive a 50% discount off those fees.

For further information, contact the society at (703) 648-9888, or for users with Internet access, send a message via electronic mail to the Internet Society at isoc@isoc.org.

➡ BY VINTON CERF

Cerf is vice president of the Corporation for National Research Initiatives in Reston, Va., and is also president of The Internet Society. He can be reached via the Internet at vcerf@CNRI.RESTON.VA.US.

Internet access at all those sites under one contract. Depending on the scope of the provider's coverage, those sites might be spread around the country or be in a single region.

Some large firms prefer the simplicity of agency agreements to the alternative — striking a deal with an access provider at every one of their sites.

Pricing information listed in the Internet access services chart, only gives a flavor of the rates and pricing structures used by the providers.

Note that every providercharges additional fees on top of service rates. These fees range in type and size, the most common being an installation fee. These can be annual or one-time fees.

Many providers also negotiate prices for certain access types on an individual case basis. For instance, Global Enterprise Services, Inc.'s leased-line and SMDS services are negotiated with each customer.

THE COSTS

Many of the regional networks charge annual membership fees in addition to monthly fees and flat-rate fees.

Sprint is the only provider that does not charge various fees for different access methods.

Instead, Sprint has a fee structure that is based on the connection speed, although there are other fees, as well.

In short, comparing one service provider's pricing to another's is possible, but it's tricky.

The issues relevant today in evaluating Internet service providers may be altered radically in years to come.

For instance, some Internet observers believe restricted-use practices will ebb with time. Observers also believe new rules will shape the treatment of product information, and possiby advertising, across the Internet.

And then there's the obvious issue of explosive Internet growth. BARRNet's Yundt says growth in terms of connections and bytes transmitted is obvious.

"Much more interesting and subtle is growth in the breadth of uses and applications, diversity of the customers, and potential for creation of a world communications society and international [possibly free] market for information and computing resources."

Should that picture unfold, Internet access providers will proliferate and users will confront a whole new set of selection issues.

➡ A contributing editor to *Network World*, Miller is president of DigiNet Corp., a Denver-based data communications engineering firm. His latest book, *Managing Internetworks with SNMP*, discusses SNMP and SNMPv2 from the perspective of the network analyst and net manager. Miller may be reached via the Internet at markj@diginet.com.

Commercial Internet traffic

Almost one third of *Network World* readers recently interviewed said the limits placed on commercial traffic on the Internet influence which access provider they select.

Focus Data, Inc. interviewed 35 readers who use or are evaluating one of the Internet access services listed in the Buyer's Guide chart on page 34.

Much of the Internet is composed of partially or wholly subsidized leased lines and host computers. Those lines and computers can be used only for educational and research purposes under federal regulations. However, privately owned portions of the Internet are not subject to these regulations.

Thus, some users choose private access providers which operate their own network and also offer gateways to the Internet over subsidized access providers.

While more than 85% of the 35 readers are from government or educational organizations, 31% say the restrictions on the commercial use of subsidized portions of the Internet influence whether they select a for-profit provider or a partially subsidized provider.

Of those who say the restrictions are not an issue today, nearly 20% say they will become a factor during the next two years.

Some readers think the Internet should continue to favor nonprofit work.

"Educational uses should have priority over commercial uses," one reader says.

Many readers say they do not have many options when selecting an Internet access provider. "We use NEARNET because it is the only regional Internet in this area," one says.

"We use SURAnet because I think it is the only choice that we have," says another reader.

Almost half of the readers said electronic mail was the single most important reason they now use or are planning to use the Internet.

Many respondents say the Internet will play an increasingly large role in their organizations.

"We now provide research to others around the world, and we access the research of others. I expect this to increase substantially," one reader says.

"We can use the Internet to pull up weather images of any place on the globe at any time," one reader says.

"We can gather textual information about any place in the world. If someone is interested in the affairs in Singapore, they can log in and gather the information they need. Also, our people might be at a conference in Italy or Korea, and they could log in from there," the reader adds.

Yet, one reader expressed some reservations about the future of the Transmission Control Protocol/Internet Protocol-based Internet. "They are running out of addresses right now. There is talk of increasing the number of addresses on TCP/IP. But we will see if that flies."

Internet access service selection criteria
Based on highest possible score of 10

Criteria	Importance rating
Ease of use	8.7
Price	7.9
Range of applications and services supported	7.8
Range of access methods available	7.7
Access protocol	7.5
Geographic scope of provider's backbone network	7.3
Number of gateways on provider's network	6.9
Training	6.2
Availability of direct international links	6.2

SOURCE: FOCUS DATA, INC., FRAMINGHAM, MASS.

Focus Data, Inc., a Framingham Mass.-based market research firm, gathers data from end users to determine network and information systems usage, trends, needs and satisfaction levels. For more information, call Mona Dobbon at (508) 626-2556.

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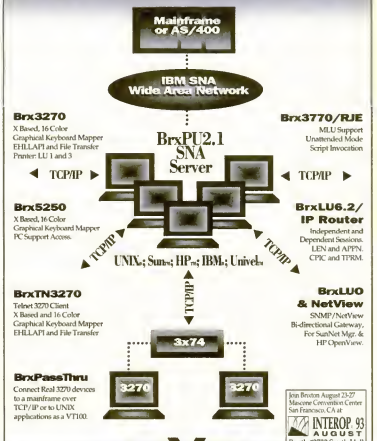

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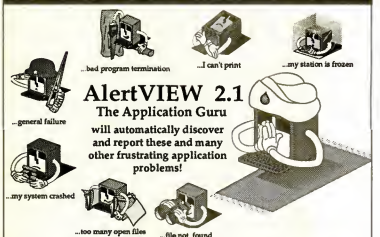

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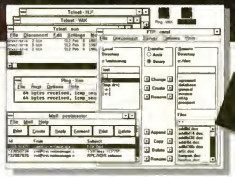

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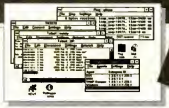

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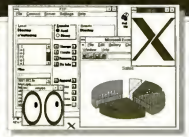

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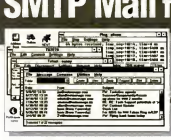

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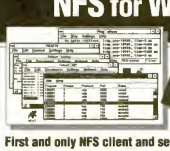

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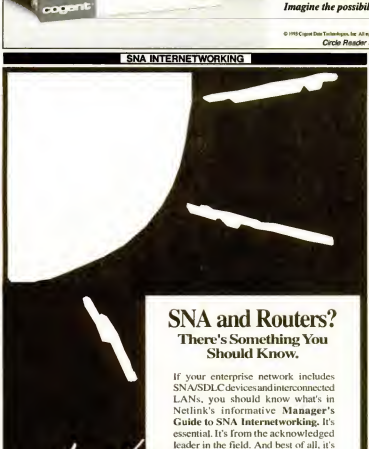

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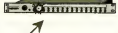

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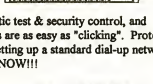

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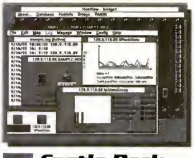

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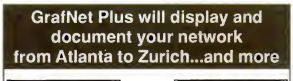

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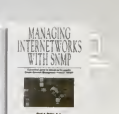
Understanding SNMP and SNMPv2



According to IDC (International Data Corporation), the installed base of internetworking devices has been growing at an average annual rate of over 65% for the past four years.

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- Survey the key elements of Abstract Syntax Notation One (ASN.1), the language used to define SNMP message formats.
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Desktop

Continued from page 1

based videoconferencing market. Only AT&T has announced a standards-based desktop system to date, said Scott Douglas, an analyst with Telemanagement Resources International, Inc., a consultancy in Lake Wylie, S.C.

Proprietary products such as Compression Labs, Inc.'s Cameo system have been "false starts" in the desktop market, Douglas said. Standards-based systems, which will allow multivendor videoconferencing, are expected to spur market growth.

Several vendors, including BT, are expected to announce standards-based desktop systems this year. The Live PCS 100 will support videoconference links with any vendor's system based on the H.261 coder/decoder standard. It will not support PictureTel's proprietary SG3 codec algorithm.

The product does, however, include a proprietary audio algorithm, the PT 724, which requires 24K bit/sec of bandwidth to deliver 7 KHz of audio.

PictureTel includes the PT 724 because it takes half as much bandwidth to deliver the sound quality of the G.721, G.722 and G.728 TSS audio standards.

The desktop system supports the latter three standards for the sake of interoperability with other equipment. "There are a lot of desktop products out there but few that work to the standard," Douglas said.

Although built to conform to videoconferencing standards, the Live PCS 100 nevertheless presents interoperability problems.

Videoconferencing arrives at desktop.

The desktop system's file sharing and cut-and-paste features, for example, do not work with PictureTel's room systems; in that case, the level of interoperability simply provides for videoconference links and far-end camera control.

The Live PCS 100 windowing features are not even fully compatible with the new System 1000 line of standards-based low-end rollabout systems, which PictureTel also introduced last week.

Although simple videoconferencing between the desktop and room systems is possible, applications such as customized user interfaces for the Live PCS 100 will not work on room system units. Users with both systems must keep two environments.

The upcoming AT&T and PictureTel desktop units — based on both standards — will be unable to share computer files or support interactive document annotation as they use different user interface software.

©PictureTel: (508) 762-5178.

PCS

Continued from page 1

from both sides of the battle. The valuable frequencies are considered ideal for PCS, which is an emerging voice/data network technology that will allow for use of very small, low-powered end-user devices.

Washington, D.C.-based industry trade group Telocator heartily endorsed the FCC decision, but representatives for microwave users, while generally pleased with the decision, were less enthusiastic.

Frequency bands for microwave users displaced by PCS carriers

Band 1 = 3.7-4.2 GHz
Band 2 = 5.925-6.425 GHz
Band 3 = 6.525-6.875 GHz
Band 4 = 10.565-10.615 GHz and 10.630-10.680 GHz
Band 5 = 10.7-11.1 GHz

Band 1 is channelized at 30 MHz, while Bands 2 through 5 will be rechannelized at 1.25 MHz to accommodate lower bandwidth requirements.

SOURCE: FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D.C.

"We got most of what we wanted," said Jeff Sheldon, general counsel for the Utilities Telecommunications Council (UTC), which represents electric, oil and gas companies with microwave backbone networks.

FCC REGULATIONS

The FCC will not only require financial compensation for evacuating the 2-GHz bands, but it also plans to issue tax certificates to microwave users.

These tax certificates would allow microwave users to defer taxes on money received for moving off the bands should there be a tax liability involved.

While the commission hopes the tax certificates will be a major incentive to move quickly, Sheldon said he doubted this would provide much of an impetus since taxes would only be deferred, not abolished.

The UTC was disappointed that the FCC did not issue special exemption to state and local governments, which would have allowed them to stay on the 2-GHz bands, according to Sheldon.

"We hoped they would have clarified the state and local exemption differently," he said.

The commission did allow exemptions for public safety microwave systems used for police, fire and medical purposes but not for administrative us. "We're trying to be clearer about services specifically for safety and services but not administrative," said Tom Stanley, FCC chief of engineering, and the FCC's decision.

Erwin Duggan, the FCC commissioner who voted for the pay-for-eviction rule, expressed sympathy for microwave users.

"Microwave users that have lived by the rules shouldn't be treated as squatters," Duggan said.

In making its decision, the FCC is assuming that there will be sufficient unused spectrum in the upper bands to accommodate the microwave users that decide to migrate to the 4-GHz to 11-GHz range.

Mississippi flood

Continued from page 1

Although the police can still use private dispatch and police radios, those channels are becoming congested. Sothey are now using RAM Mobile Data, Inc. wireless equipment for electronic mail messaging.

The RAM system lets the police converge on "hot spots" in the flooded areas so they can move people to hospitals, oversee flood evacuations and watch for looters, Cunningham said.

The police department's mainframe is also waterlogged. "A lot of our [data] is on the mainframe, but thank God we have a lot of the same stuff on the PC," he said.

He added that he could not help but hope the mainframe would float away in the flood, so eager is the police department to migrate to distributed systems this September.

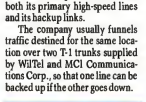
The credit services division of farm equipment manufacturer John Deere, located in Des Moines lost a few of its WilTel-supplied lines for 2 1/2 days, said Roger Catchior, manager of computer operations for John Deere in West Des Moines.

But the company's business was not disrupted because those lines were automatically backed up by T-1 lines from AT&T.

"When we originally set up our network, we purposely put each location on a different carrier's T-1 service, with a T-1 link running between the two locations," he said. "That planning paid off for us in a big way here."

In St. Louis, the AG Edwards & Sons, Inc. stock brokerage house was not as lucky. It lost service on both its primary high-speed lines and its backup links.

The company usually funnels traffic destined for the same location over two T-1 trunks supplied by WilTel and MCI Communications Corp., so that one line can be backed up if the other goes down.



But the flood foiled that plan.

"There were several hours of no dial backup," said James Mettes, assistant director of software systems at AG Edwards.

"We were able to compensate and switch off, in some cases, to locations, but we sustained loss of service and some very upsetting loss of backup in other locations once we lost the primary link. So it's put some offices out of business for a spell, and in the stock market, that's big bucks you're losing."

The flooding also had phone companies working overtime. US West Inc. said it is handling about 3,500 repair calls a day from customers in Iowa and southern Minnesota.

About 2,200 outages are being restored each day but reports continue to pour in.

The average time to install new service requests is about nine days, US West said.

One fiber-optic cable running north between Ames and Marshalltown, Iowa, was washed out last week, disrupting service for about 24 hours before a repair crew — operating out of a boat — was finally able to restore the service.

And in the Missouri capital, Jefferson City, the rising levels of the Missouri River threatened to drown a switch that links the Missouri Research and Education Network (MOREnet) to a Sprint Corp. point of presence.

MOREnet provides 39 schools, government agencies and businesses with access to the Internet.

Even network managers at organizations located atop Missouri hills were fearful.

"Being on relatively high ground doesn't mean your network is safe," said Gerry Howser, a network manager for Lincoln University in Jefferson City.

"The flood waters are rising quickly and have already risen into a room adjacent to our computer center."

Many in the city have been asked to evacuate, and the university may be next. "Unfortunately, we can't take our campuswide network with us," Howser said.

RBHCs

Continued from page 8

offer long-distance service. As of press time, Pacific Telesis Group was awaiting a state judge's ruling on opening up long-distance service in California.

A former FCC staff member predicted that the commission would adopt a "go slow" approach on the five RBHCs' request. With the Ameritech petition before it, as well as a request to restructure from Rochester Telephone Corp., the former staff member predicted that the commission's first step would be to undertake an all-encompassing notice of inquiry, which is the FCC's means of bringing in outside comment.

Under the Consent Decree ruling that governs the breakup of AT&T, the seven RBHCs were barred from long-distance service, manufacturing and information services. The ban on information services was lifted by the U.S. Court of Appeals in Washington, D.C. in 1991, but the manufacturing and long-distance bans remain.

The five RBHCs hope for a two-step repeal of the long-distance ban. First, the five want to persuade the FCC to formulate rules that would govern RBHC long-distance services. Then, with a set of rules in hand, the five plan to go to court to have the ban removed.

Finding a legal basis for the petition required some rather limber reasoning by the companies. When the U.S. Court of Appeals in Washington observed that FCC nondiscrimination safeguards and cost separation principles had not been expressly applied to the possible RBHC provision of long-distance service, the RBHC lawyers interpreted that observation as an explicit invitation to the commission to begin formulating rules.

A former FCC staff member predicted that the commission would adopt a "go slow" approach on the five RBHCs' request.

Plus, the FCC told Judge Harold Greene in 1987 that it could take up long-distance service for the RBHCs either under section 214 of the Communications Act or by proceeding to set up new rules. The RBHC lawyers have interpreted that statement as an indication of the commission's willingness to take up the issue six years later.

In arguing for the removal of the long-distance ban, the RBHCs claim

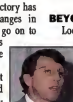
NetWare

Continued from page 1

updates are done in order — the first changes made will be the first replicated. But if the system comes upon a change that is in progress, it will wait.

This can hold up the synchronization process for as long as a half-hour, according to one Novell source.

In NetWare 4.01, the directory has been enhanced to flag changes in progress, letting the system go on to synchronize other changes and then go back and complete the update.



NEWMAN

"NDS seems to he a lot faster this time around," said Drew Finnie, technical advisor for Application Systems Group, Inc., a systems integrator in Stoneham, Mass., that has a copy of the new release.

The 4.01 release, however, is not backward compatible with NetWare 4.0 directories.

According to Novell, there is no directory synchronization between 4.01 and 4.0, so if an object is changed on a 4.01 server, it will have to be manually changed on the 4.0 server and vice versa.

But analysts did not seem overly concerned about the compatibility hole, primarily because there are so few users of 4.0 thus far. "This puts a wart on the side of the people who jumped forward with 4.0, but we all know those people are few and far between," said Cheryl Currid, president of Currid & Co., a Houston-based local-area network consultancy.

Because of the inconsistency, Novell recommends users change over all their 4.0 servers to 4.01 at the same time.

The company also stated that all future releases of NetWare 4.X will he compatible with the 4.01 NDS.

Besides support for Macintosh clients, NetWare 4.01 also includes OS/2 Presentation Manager management utilities that let administrators handle the network through the Presentation Manager interface, not just through Windows or DOS.

And NetWare 4.01 has updated VLMs to enhance client performance when establishing a connection with the server.

BEYOND 4.01

Looking beyond 4.01, Novell plans to satisfy the demands of its high-end users looking for multiprocessing capabilities.

"We want to use NetWare for our database services, but because NetWare is not a symmetric multiprocessing operating system, we're forced to use other, higher end platforms," said Paul Bandrowski, technology manager at Sara Lee Corp. in Chicago.

Novell is currently developing multiprocessor support for NetWare, but it is not symmetric. "Our approach is based on a distributed multiprocessing model," Young said. "It's a loosely coupled approach."

He explained that Novell's NetWare Management System can track CPU utilization on both servers and desktop personal computers throughout the network.

Under a distributed multiprocessing model, also known as virtual symmetric multiprocessing, the management system would he able to distribute jobs among various processors.

Young would not provide a time frame for when this might be available, although he did admit that it is currently under development within Novell. ☐

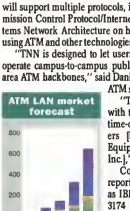
ATM market

Continued from page 1

Key to TNN's operation is software, which adheres to IBM's new Broadband Network Services architecture. Broadband Network Services, previously known as Autohahn, lets users allocate handwidth on demand, control congestion, determine ATM network status and select optimum net routes.

The architecture also defines how IBM products will support multiplex protocols, including the Transmission Control Protocol/Internet Protocol and Systems Network Architecture on high-speed networks using ATM and other technologies.

"TNN is designed to let users build, control and operate campus-to-campus public or private wide-area ATM backbones," said Daniel Ahensour, IBM's ATM systems manager.



"TNN will also work with the IDNX family of time-division multiplexers [built by Network Equipment Technologies, Inc.]," Ahensour added.

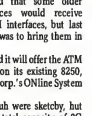
Contrary to earlier reports, equipment such as IBM's 3745 front end, 3174 cluster controller, 3172 LAN-to-host interface and 6611 router will he supported under TNN by using frame relay to access ATM backbones.

IBM previously indicated that some older devices would receive ATM interfaces, but last week executives said the plan was to bring them in through frame relay.

At the campus level, IBM said it will offer the ATM Intelligent Hub family, based on its existing 8250, which is a version of Chipcom Corp.'s ONline System Concentrator.

Details of the 8250 ATM hub were sketchy, but IBM said the hub will have a total capacity of 8G bit/sec and will support ATM-attached workstations, servers and applications.

The ATM-based 8250 hub will support existing LAN implementations via a LAN-emulation feature, allowing applications on token-ring, Ethernet and Fiber Distributed Data Interface LANs access ATM services.



HANCOCK

IBM also announced ATM adapter cards for personal computers and Unix workstations that will support ATM at 25M, 100M and 155M bit/sec over shielded or unshielded twisted-pair wiring.

The company did not announce pricing for any of the ATM products but said it plans to begin shipping the ATM hub and LAN adapters by mid-1994.

The TNN ATM switch will go into beta testing at Advantis, which is the firm's majority-owned value-added network company, by the end of this year, hut TNN probably will not be publicly available until late 1994.

INDUSTRY REACTION

Analysts and users greeted the IBM announcement with wary enthusiasm.

"IBM is trying to lead the ATM market rather than follow," said Todd Dagres, vice president of data communications at The Yankee Group, a consultancy in Boston. "IBM is determined not to miss the hoat, as it did with the LAN internetwork market."

Mary Cochran, a principal with the Vertical Systems Group consultancy in Dedham, Mass., said, "The ATM announcement was very hroad, hut it shows IBM has a vision, something it has lacked recently. IBM has a very good chance of influencing the market with the products and chipsets."

Jamie Zartman, senior husiness planner with third-party SNA product developer McDATA Corp., said, "It isn't clear how they want to migrate all of the existing equipment, especially mainframes, onto a frame relay network. There's hillions of dollars worth of equipment that IBM seemingly ignored with this announcement."

Some users see the value of ATM but aren't sure IBM will be the vendor they will turn to. "We know ATM will solve our bandwidth and speed problems in the future," said Graham Morrison, project leader for network design at Blue Cross/Blue Shield of Connecticut in North Haven, Conn. "I'm just not sure if IBM products will be involved.

"IBM has promised us a lot of technology — like an intelligent hub, which they ended up getting from Chipcom Corp. — over the past couple years and not delivered on it, so they're going to have to show us a lot first."

✆IBM: (800) 426-2648.

ATM market development

Network type	Bleeding edge	Early adopters	Mass market
Workstation LANs	1993	1994	1995
PC LANs	1995	1996	1998
LAN beachheads	1993	1994	1995
WAN backbone	1994	1995	1997
Public MAN services	1993	1994	1996
Public WAN service	1993	1994	1996

GRAPHIC BY TERRI MITCHELL SOURCE: THE YANKEE GROUP, BOSTON

that FCC regulations on cross-subsidization, equal access to the network and control of network information will ensure the proverhial level playing field in the local loop.

A complete regulatory regime governing RBHC long-distance services is ready hut needs the commission to pull such rules together into a coherent whole, the companies argue.

"The commission can retake the policy initiative in this area by setting the express terms and conditions for BOC entry into inter-LATA services," the RBHCs said.

When it comes to the current provisioning of long-distance service, the RBHCs claim that consumers have suffered under an oligopoly of AT&T, MCI Communications Corp. and Sprint Corp. For example, the RBHCs claim that any decrease in long-distance rates is almost entirely due to cuts in access prices by the RBHCs.

As for their own markets, the RBHCs sought to convince the FCC of the stiff competition they face by pointing out that consumers can turn to providers of inside wiring and private exchanges, cellular carriers, competitive access providers and cable companies for alternative service.

An AT&T spokesman called the RBHCs' claim of effective competition in the local loop "complete hogwash." The Bell operating companies still have monopoly control over the local loop, the company charged. To support its claim, AT&T said it had paid out $14.2 billion to the Bells in access charges but only $19 million to competitive access providers. ☐

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With Protocol Independent Routing, It's Easy To See How LAN*TMS Runs Rings Around Everything Else.

Internetworking often presents major problems in a Token Ring environment. To date, users have lacked an efficient way to integrate distributed LAN applications with mainframe SNA traffic.

Now LAN*TMS, a powerful new router from General DataComm, provides the solution. Its unique Protocol Independent Routing (PIR) design can "route the unroutable," including SNA and IBM LAN protocols such as NetBIOS, without the need to encapsulate them in TCP/IP or other protocols.

So LAN*TMS doesn't force you to migrate from an SNA to a TCP/IP backbone. Instead, it allows easy travel into an efficient internetworking future.

Much of the system's power and usability comes from its unique Address Processor and Directory. This hardware module automatically seeks out and learns workstation addresses and other parameters that are vital in routing and network management.

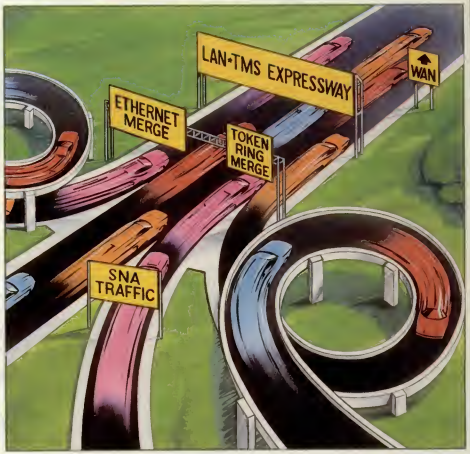
Within seconds of power-up, the LAN*TMS system determines this key information for each station in the network. When a computer is moved or added, it automatically reflects the change, eliminating endless hours of network support time.

Besides easy installation and usage, GDC's LAN*TMS offers other advanced capabilities, such as its SPF (shortest path first) link-state routing protocol.

This allows you to take full advantage of a secure mesh network configuration, routing around failed WAN links, failed LANs, or congestion. SPF prevents session timeouts and increases efficiency, selecting paths based on WAN traffic, line usage, error conditions — and priorities set by you, the network manager. LAN*TMS won't congest WAN links and waste precious bandwidth with unnecessary traffic.

LAN*TMS also provides support for IBM's LAN Network Manager, for SNMP, and for GDC's Internetworking Management System (IMS), as well as for MEGAVIEW. GDC's most advanced network management system.

And LAN*TMS is backed up by a worldwide sales and service organization offering everything from on-site maintenance to disaster recovery.



To learn how LAN*TMS efficiently integrates your Token Ring/Ethernet internetworking, ask for a free copy of our white paper, WHY IBM/TOKEN RING CUSTOMERS NEED PROTOCOL INDEPENDENT ROUTING. Just call +1-203-792-0542. In North America, call toll free 1-800-777-4005.

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